THE HANDYMAN IN THE HOME

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Assisted by

SEVERAL EXPERTS



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BARRELS, WOODEN, CARE AND USE OF

Barrels, or casks, for liquids are generally made of oak, and the staves are held together by iron hoops. A lighter class of barrel, for dry goods only, has wooden hoops. The first are the most useful and can be obtained from coopers or from wine and spirit merchants. A frequent use for household purposes is to contain rain-water, the cask being stood under the end of a pipe from the roof gutter. Generally the full height of a cask is used, but sometimes it is convenient to cut a large one across the middle and use the halves separately. An entire barrel and a half-barrel are shown in Figs. A and B. Generally they are stood on bricks or on baulks of wood to raise them off the ground and so reduce possibility of rotting the wood by contact with damp earth.

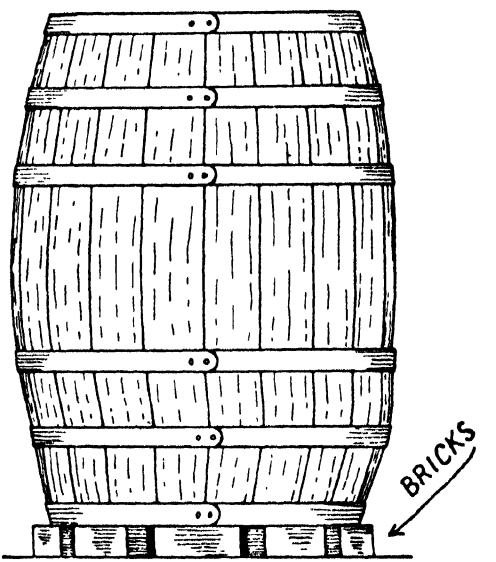
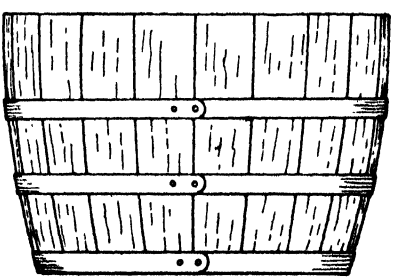


Fig. A.—Rain-water Butt Mounted on Bricks

Sometimes it is convenient to have the upper edge of a half-barrel sunk level with the ground and close it in tight with stones and earth all round, so making a miniature pond of it. In other cases it may be raised some distance above ground level by mounting it on a stand with legs.


Fig. B.—Half-barrel for Tub.

Rain-water Cask.—To make a cask for rain-water as durable as possible it should be tarred or painted inside and out. Generally paint looks better outside and tar is better inside. Before either is applied it should be scrubbed clean, preferably with hot soda-water, and dried. Rain-water can be kept cleaner by having a cover on top. The original

head of the barrel is hardly suitable for this owing to its small diameter, but a cover may be made or can be bought ready made as used for coppers. Fig. C shows a cover the battens of which are intended to be on the under side and fit inside the barrel at their ends, to keep it in position sideways. If the outer edges of the cover slightly overlap the top of the barrel, there is no need to have a handle on top for lifting. The portion seen cut out of the edge in Fig. C is for the rain-water pipe to enter.

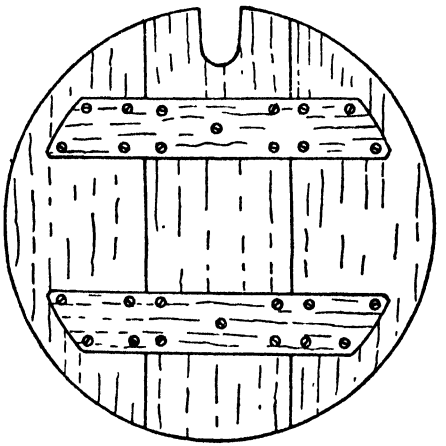


Fig. C.—Cover for Water Butt.

As a cask has only a limited capacity, there must frequently be an overflow of water when there is much rain. To keep the overflow from running down the outside of the cask it is neater, if there is a drain below, to fit an overflow pipe which directs the surplus water to the drain. A draw-off tap in the lower part of the cask is sometimes fitted. An overflow pipe may be of iron tube about ¾ in. diameter, as used for gas or water. It may be straight or have a bend downwards at its outer end. Its inner end should be threaded so that nuts and leather washers can be tightened up on it inside and outside the cask, and it should be a tight fit in the hole, besides which red or white lead may be used to make it a watertight fit. A tap at the bottom of the cask may be a wooden spigot or a brass tap. For the first the hole bored through the wood should preferably be tapered to fit the taper of the spigot, which is simply driven in tight. A brass tap screws in, and requires a hole the right size to make it a watertight fit. White lead may be used here also, and a leather washer between the wood and the shoulder of the tap.

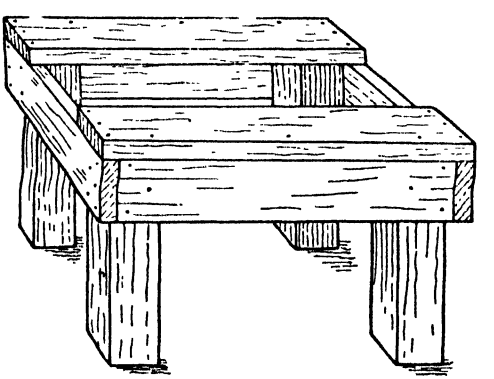


Fig. D.—Stand for Washtub.

Washtub.—A half-barrel can be used as a washtub. It may be painted on the outside, but anything applied to the inside would soon wear off and it is better to leave bare wood. For washing, the tub needs to stand on something which raises it to a convenient height and a stand, as in Fig. D, specially for the purpose is desirable. A stand with four legs is shown because it is easier to make than one with three, but an advantage of three is that it cannot rock on uneven ground. It is desirable also to have handles of some kind for

lifting the tub. These may be of wood or metal, an example of the first being shown in Fig. E.

For Shrubs, etc.—Another common use for half-barrels is to fill them with earth and plant shrubs, ferns, or flowers in them. For this purpose the inside may be protected with a coat of tar before filling with earth, and the outside should be painted. An ornamental effect can be obtained by painting the hoops a different colour from the wood. It is advisable to bore holes through the bottom for water to drain away.

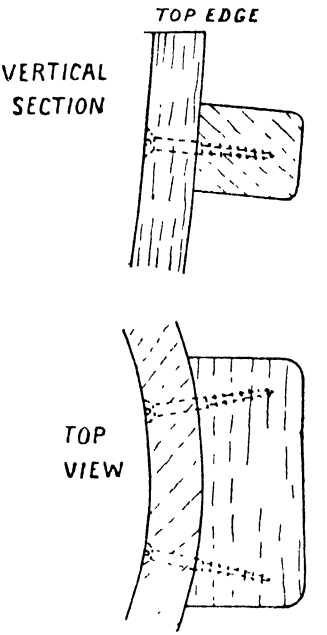


Fig. E.—Wood Block Screwed to Outside of Tub for Lifting Purposes. The Blocks are Fitted on Opposite Sides.

Repairs.—An old barrel may open at the joints through rusting and breakage of one or more of the hoops. A sound hoop may become loose through getting out of place, and it can be tightened and the cask made watertight again by driving the hoop as far as it will go on to the larger diameter of the cask. This is done with a hammer and very blunt chisel or other suitable piece of iron or steel. If the old hoop is taken to a coppersmith or blacksmith a new one can be made the same size, but it can easily be done at home if a length of hoop iron and a rivet are obtained. The hoop iron is cut to the length of the old hoop and the ends are punched or drilled for the rivet. Sometimes two rivets are used (see Figs. A and B). The iron is bent round the barrel to give it the approximate curve and then held upright on an anvil or block of metal, the rivet inserted from beneath and hammered above until it has spread sufficiently to hold the ends securely together. The reverse method, with the rivet head inside the hoop, is sometimes preferable if the hoop can be held conveniently for doing it. The two views in Fig. F show details of a riveted joint. After this, with the hoop still in the upright position, it is necessary to hammer one of its edges to expand the metal and so give the hoops a slight taper to suit the taper of the barrel. It is then driven on, tightening itself as it passes from the smaller to the larger diameter of the barrel.

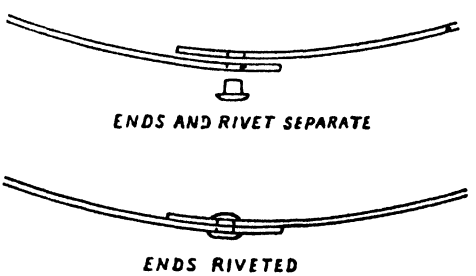


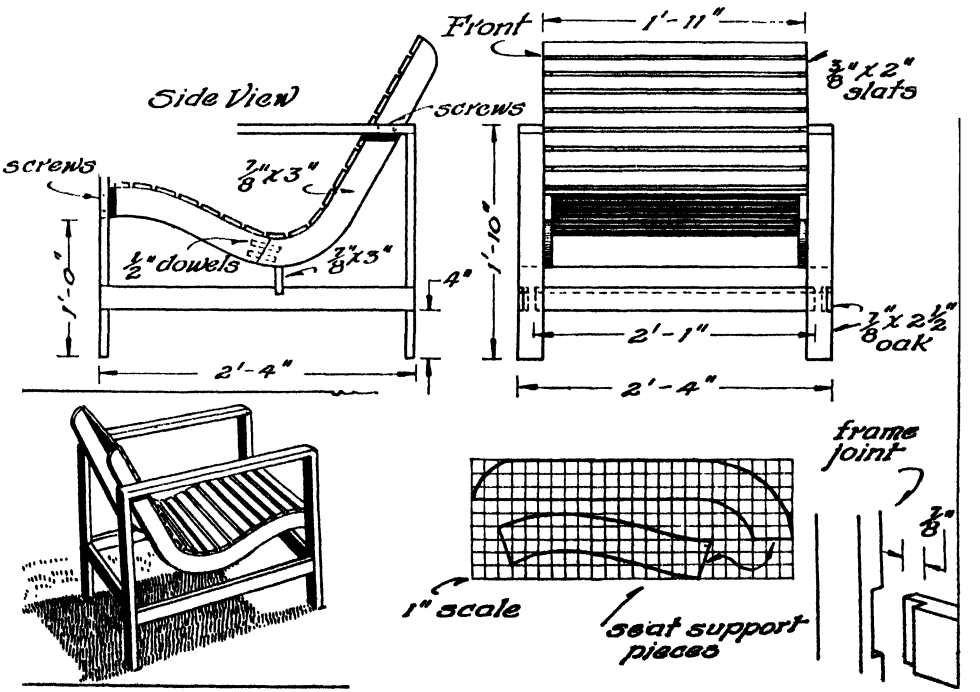
Fig. F.—Lap-joint Method of Uniting Ends of Hoops.

An attractive and at the same time very useful seat for indoor or outdoor use can be made from an oak barrel. The one illustrated in the Plate facing page 6 was made from a barrel having the following dimensions, viz., height, 3 ft. 9 in.; maximum diameter, 2 ft. 1 in.; diameter of ends, 1 ft. 9 in.

The iron bands were cut with a hacksaw and the ends and staves with an ordinary fine-tooth wood saw. When cutting the iron bands do not saw straight down but leave enough overlap to allow for bending back and round the exposed edges of the staves. If a hole be drilled in the bent portion of the band it can be secured to the inside of the stave with a wood screw; this method of bending back the bands not only gives a neat appearance but obviates any rough exposed metal edges. The height of the seat above the ground was 1 ft. 2 in. The seat portion is made in two parts from pine or deal planks cut to shape. The rear half is fixed to wooden runners or supports which are screwed to the insides of the staves. Similar front supports are also fixed, but the front half of the seat is either made a loose fit or is hinged to the front (straight) edge of the rear portion of the seat, so that access can be obtained to the space below the seat. The latter acts as storage space for various objects and will be found very handy.

It is a good plan to drill a few additional holes for wood screws around the iron bands, to ensure that these hold all the staves securely, at all times.

The particular barrel chair illustrated was finished by smoothing off all rough edges with a file and sand-paper and then painting all the exposed oak surface with two coats of middle green enamel, whilst the metal bands were given one coat of a good-quality aluminium paint—as used for cycle parts. The finished chair is provided with a loose cushion and is quite comfortable in use.



A Comfortable Garden Seat or Chair.



A USEFUL SEAT, WITH LOCKER, MADE FROM AN OAK BARREL

CHAIR FOR PORCH OR LAWN USE

To make this useful outdoor chair use $\frac{7}{8}$ in. oak or hard wood in cutting out the two pieces which support each side of the seat and back, cutting them out as shown in the 1 in. scale. They are assembled with $\frac{1}{2}$ in. maple dowels $2\frac{1}{2}$ in. long, glued in place as indicated by dotted lines. The finished pieces are 3 in. wide. Cover the supporting pieces with $\frac{3}{8}$ in. by 2 in. slats spaced $\frac{1}{2}$ in. apart. The chair frame consists of 4 pieces at each side, cut from $\frac{7}{8}$ in. oak or hard wood, and trimmed to $2\frac{1}{2}$ in. width. The frame is braced with similar material at a point 4 in. from the bottom, with glued frame joints as shown, together with screws. A cross-piece supports the seat and is fastened directly beneath the curved seat, resting on notches cut in the side braces and in which the piece is glued. Note that the seat and back supports are attached with dowels or screws to the frame at each side. If oak is used, stain and finish with spar varnish, or enamel the chair a bright colour.

FENCE ERECTING

In these days of high labour costs the householder who can execute certain classes of work in the building line has a distinct advantage over his fellows so far as financial outlay is concerned. The erection of fencing is one of the jobs that most amateurs could turn to, and the accompanying drawings show the construction of two substantial types of fencing ordinarily used for fencing round dwelling-houses.

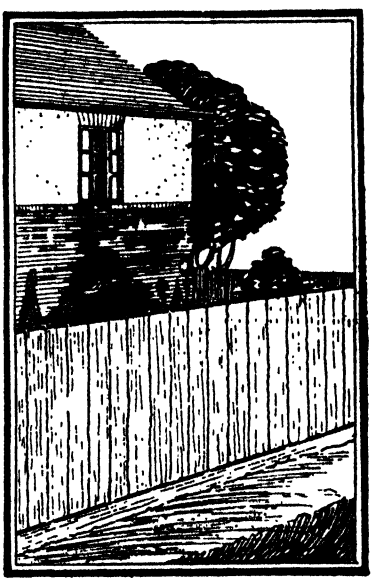


Fig. A.—Attractive Close-board Fencing for Houses.

Close-boarded Fence (Fig. A).—The close-boarded fence is 5 ft. 6 in. high with posts, rails, stays, and pegs of larch and having $\frac{3}{4}$ in. grooved and tongued boarding of redwood, in widths of 4 in. to 6 in. as desired, nailed to the framing. The posts (which have three checks, each 4 in. by $1\frac{1}{2}$ in. to take the rails) are placed at 6 ft. centres and are 8 ft. 4 in. long; 3 ft. of this is let into the ground, the earth being firmly rammed round the posts after they are in position. At every third post stay pieces 6 ft. long are firmly nailed to the sides of the posts and to the pegs, the latter being driven about 2 ft. into the ground. In this type of fence it will be noticed that the boarding does not come close down to the ground, a skirting piece being nailed through the boarding to the bottom rail so that if the fence should start to rot at ground level all that is required to be done is to remove the board affected and fix a new piece of skirting in its place.

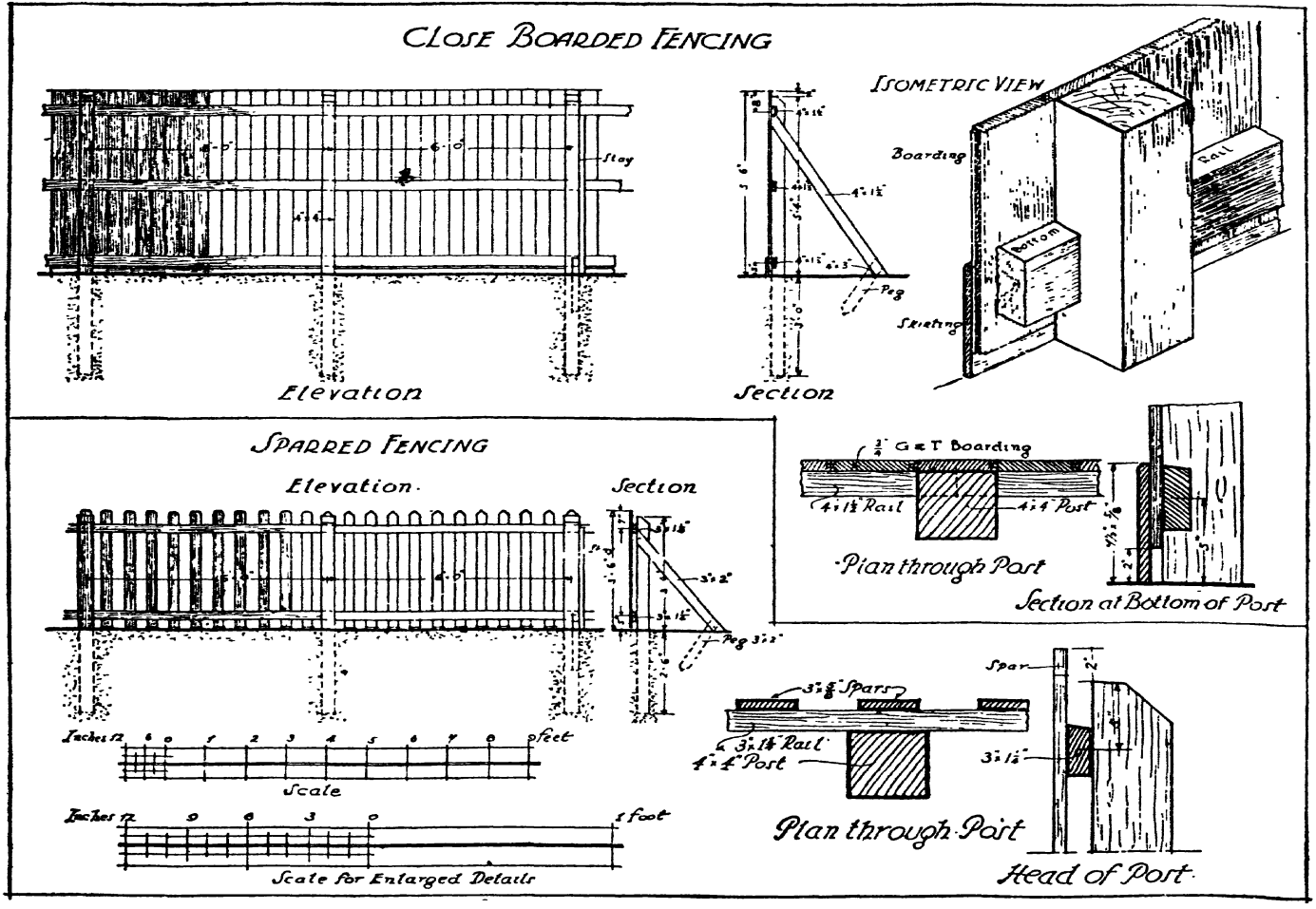


Fig. B.—Illustrating Method of Erecting Fencing.

The Sparred Fence (Fig. B).—The sparred fence is of lighter construction, being 3 ft. 6 in. high with posts at 6 ft. centres as in the other type of fence. In the construction, however, the rails are simply nailed and not checked into the posts. The spars should be fixed at about 5 in. or 5½ in. centres and they can have pointed or rounded heads according to taste. Stays 4 ft. long nailed to pegs are provided as before, and similarly the posts, rails, and pegs are of larch, the spars being of red or white pine.

In both types of fences the post heads and tops of rails are bevelled to throw off the water. All posts and pegs, where underground, ought

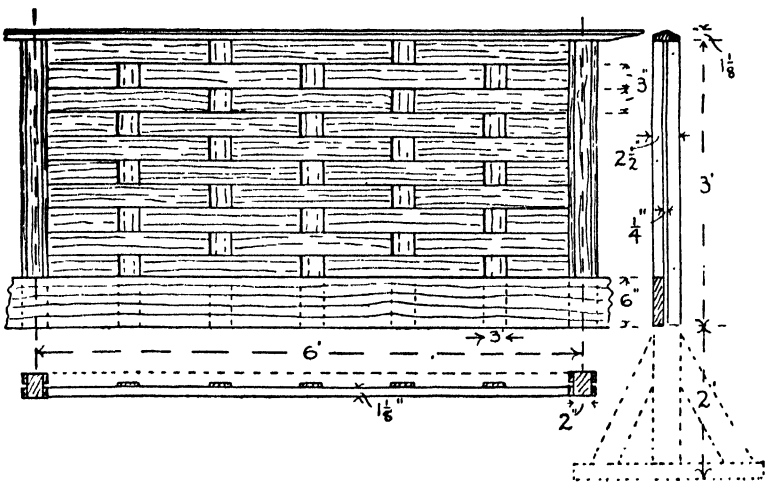


Fig. C.—Woven Board Type of Fencing.

to be charred, or treated with some wood preservative, such as creosote, and if desired the whole of the fencing above ground may be treated with two coats of similar material.

Fencing of Woven Wood.—Woven wood fencing is made with stout posts let into the ground at intervals, with strips of thin wood-woven panels between the posts as in Fig. C.

Suitable Dimensions.—The material for the panels need not be more than ¼ in. thick; the strips may be any width from 1 in. to 6 in. wide. It is quite a simple matter to do the weaving, and although dimensions have been given in the accompanying diagrams, these should be taken as a guide to suitable proportions. In some districts it may be possible to obtain sawn strips 3 in. by ¼ in., in others 4 in., 5 in., or 6 in. by ¼ in., or some other intermediate width. In the diagrams, the uprights of the woven panels are composed of the same material as the strips used in the weaving, but there is no reason why they should not be wider. Quite a good effect is obtained by using upright strips 6 in. by ¼ in. and weaving two strips at a time.

This method of fence making can be used for fences up to 6 ft. high, but in this case stouter posts should be used, about 3 in. by 2½ in.,

with an allowance of about 3 ft. to let into the ground. For fences up to 4 ft. high, the dimensions given in Fig. A will be sufficient for the posts, although the depth should be about 6 in. more.

Method of Construction.—The method of construction is clearly shown in Fig. D, alternative methods of forming the upright posts being given at A and B, sections corresponding to these posts being shown below. The distance between the posts, measured from centre to centre, should be 6 ft., if strips of this length are used for the horizontal weavers. With the aid of a plough plane, it is a simple matter to groove the uprights on each side; the material should in this case be 2½ in. square. In the posts as at B, the material should be 2½ in. by 2 in., with ¾ in. or 1 in. thick strips nailed on with a space of ¼ in. between. The skirting shown at C should be let into the uprights, and the uprights of the weaving nailed to it. To increase the strength of the panels, it is a good plan to drive in a centre upright of 1 in. thick wood as at D. The uprights can be let into the ground plain, but a better job is made when the uprights are strutted as shown by the dotted lines at Fig. C (right-hand diagram. The capping may be of 1 in. material with ½ in. strips nailed underneath with a ¼ in. space left between as at E, or of 1⅛ in. material with a ploughed groove as at F, or it may be plain as at G and secured by nails.

A Woven Lath Fence.—A method of making a woven fence, using ordinary laths, is shown at Fig. E, with the necessary dimensions for uprights suitable for a 3 ft. high fence. The laths are those used by the builder for plaster partitions and ceilings, and are 4 ft. 6 in. long by 1 in. by $\frac{1}{16}$ in. Laths are obtainable in several lengths, but for the purpose of fencing it is better to have them 4 ft. 6 in., the longest lengths usually stocked. Apart from the laths and the uprights, which should be about 3 in. by 2 in., the other material required comprises the uprights of the weaving, 1 in. square in section, and the skirting of 9 in. by 1 in. board. It is an advantage in fencing to have a stout skirting, as it adds considerably to the strength of the fence.

Creosoting.—Creosote is by far the best treatment for woven wood fencing; it is cheap, easily applied, and it preserves the wood better than paint. It is important to thoroughly coat that portion of the post which is buried in the ground. If the ground is naturally damp, in is better to coat the lower part of the wood with pitch; this will prevent dry rot. In fixing the posts in the ground for a length of fencing, fix the two posts at the extreme ends, and stretch a couple of lines between them; these will give the position of the intermediate posts and ensure them being in line.

Gateways.—Although gates may be made with woven strips, the better plan is to make a gate with two uprights, with tenoned rails and diagonal struts as shown in the elevation at Fig. F. The uprights should be at least 3 in. by 2½ in., the top rail 2½ in. square and the



(1) Stretch a Line between the Posts to ensure the Fence being straight. Excavate the Soil to a depth of 18 in. or so and then insert the Post, as shown.



(2) Set the Post upright. Earth into the Hole and ram it down firmly.



(3) Complete the Work by fixing strong Galvanized Wire ($\frac{1}{8}$ in. to $\frac{1}{16}$ in. diameter) to the Posts, using Staples driven half-way in. Then tighten the Wire and drive the Staples right home to secure the Wire tightly.

ERECTING A WIRE FENCE.

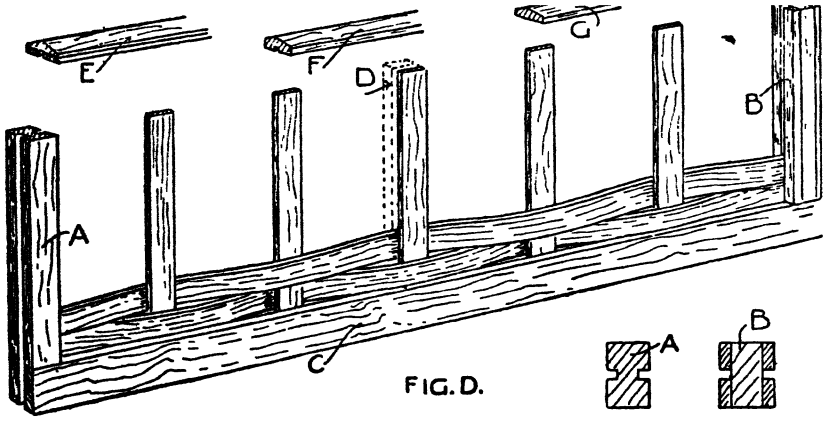
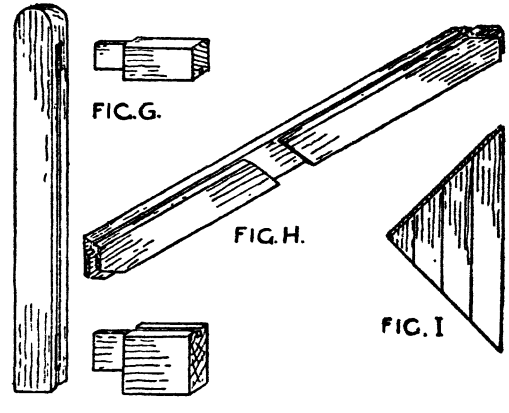


FIG. D.



Constructional Details of Woven Board Fencing.

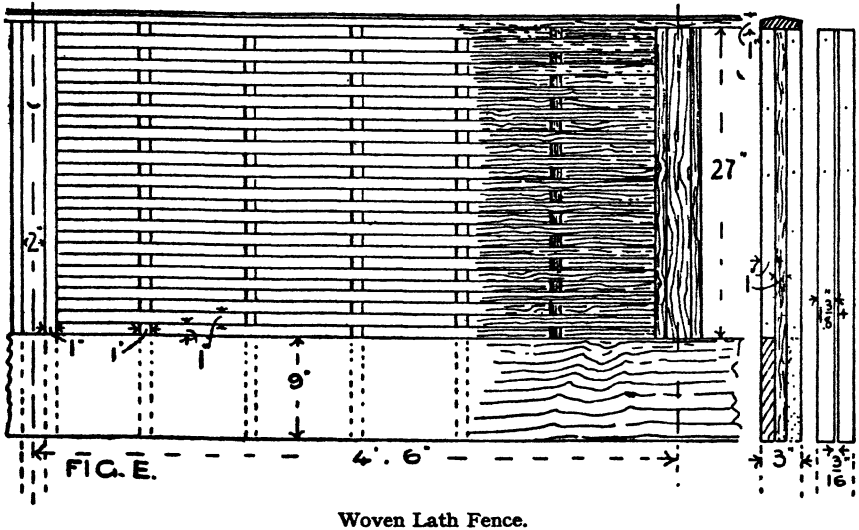


FIG. E.

Woven Lath Fence.

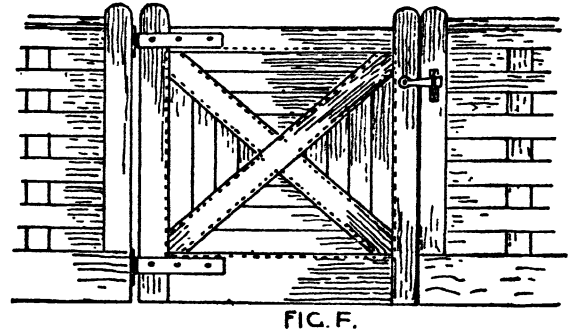


FIG. F.

Design for Gate.

bottom rail 3½ in. to 4 in. by 2½ in. The uprights should be ploughed with a ¼ in. wide groove as well as the rails, as shown in the separate detail at Fig. G. The two diagonal struts, as shown at Fig. H, should be notched into the angles of the rails and uprights, halved in the centre and ploughed with a ¼ in. groove. The panels are filled in with ¼ in. thick strips as at Fig. I. The construction is more difficult than the fencing, but a gate must be strong to stand ordinary wear and tear.

FISHPOND

A fishpond is undoubtedly an attractive addition to the garden, and the following notes will assist the amateur to construct a pond 12 ft. by 6 ft. by 2 ft., which dimensions can, however, be modified at will.

In designing such a pond it is well to bear in mind the destructive effects of frost, and with reference to attached sketch it will be noticed that a good batter is allowed on the walls to minimise the outward pressure of ice. It is further desirable to form a good wide rim or path around the pond to prevent the admission of frost to the under side of the concrete, where it might crack same by bursting upwards.

Allow for a depth of 4 in. of concrete all over pond bottom, walls, and rim, and excavate accordingly, afterwards tamping the earth to form same, or if this be soft, tamp in a few inches of broken stone or clinker.

Next prepare a wooden former to suit the inside dimensions of pond. This can be constructed of 1 in. boarding arranged to come apart easily; it should be suitably strapped and stiffened to prevent bending inwards and be sufficiently deep that the top will be level with top of rim when the former is laid in position on top of concrete bottom.

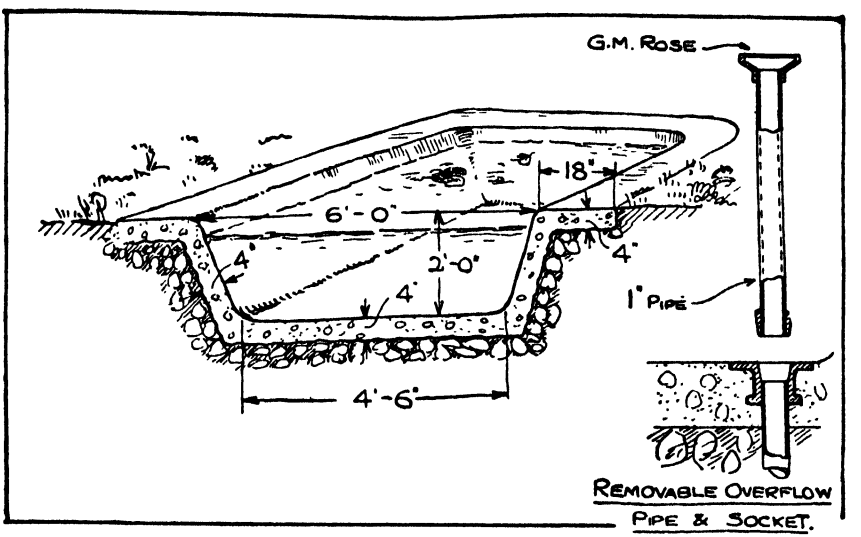
Mixing the Concrete.—A mixing-board of approximately 10 ft. by 8 ft. should now be made, and having decided upon a concrete mixture of 1 part cement, 2 of sand, and 3 of broken stone (¾ in.), mix a suitable quantity of sand and cement in the proportion of 2 to 1 respectively by turning over twice, then add the broken stone and turn whole over thrice. Now add the water slowly and give complete mass three turns at least until thoroughly mixed and saturated.

The Bottom.—The bottom of pond should be laid first and levelled to four pegs driven into the ground at the four corners. Next, place the former in position and having centralised this in the excavation, fix it to pegs driven into the ground on all sides after levelling up the top boards. Concrete should now be run into the space between former and sides of excavation to form walls and this should be lightly tamped into position and filled up to top, when rim can also be formed.

Care should be taken not to allow many hours to elapse between the placing of the pond bottom and the walls, otherwise these might not make a good bond. It is also important when filling in the walls to either fill in all sides simultaneously or start at one point and work round, laying a thin layer all the way until the top is reached.

Should the ground at the bottom of the excavation be very soft, it may be necessary to reinforce this by the insertion of a sheet of wire netting, expanded metal, or ¼ in. iron rods.

Inlet and Overflow Pipes.—If inlet and overflow pipes are to be fitted, these will require to be laid in position before placing the concrete and the wooden former should be made to suit same. The overflow pipe may be arranged, as shown in sketch, the top part being made



A Small Fish and Plant Pond.

removable, so that the tank may be emptied for cleaning purposes. A perforated cap should be fitted to top of overflow pipe to prevent the exit of fish.

Allow the concrete to harden for at least three days before removing the former, then the complete surface and rim may be finished with a facing composed of ½ in. of a mixture of equal parts sand and cement.

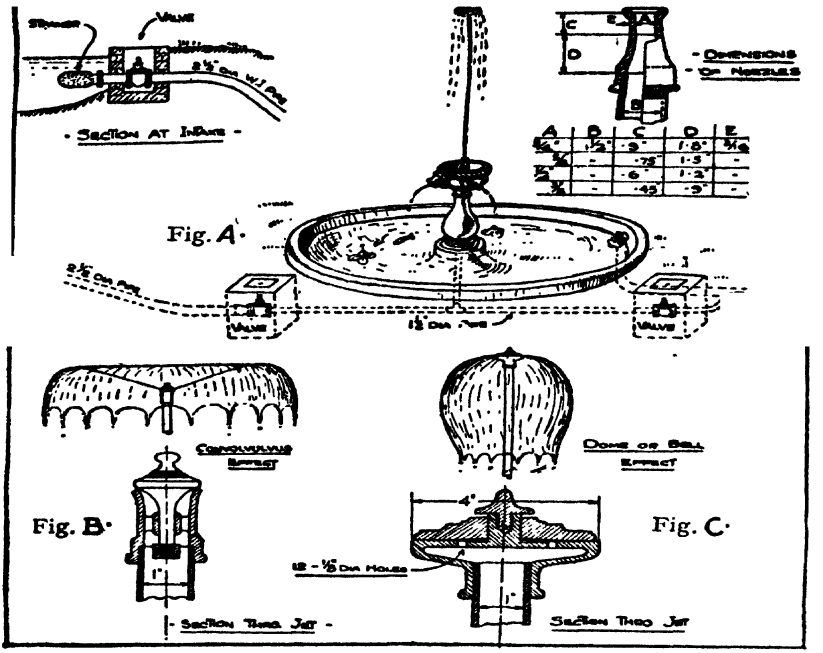
Cover up with bags and when fairly hard sprinkle with water every day for a week at least, when the bags can be removed and the pond filled up.

FOUNTAIN AS GARDEN ORNAMENT

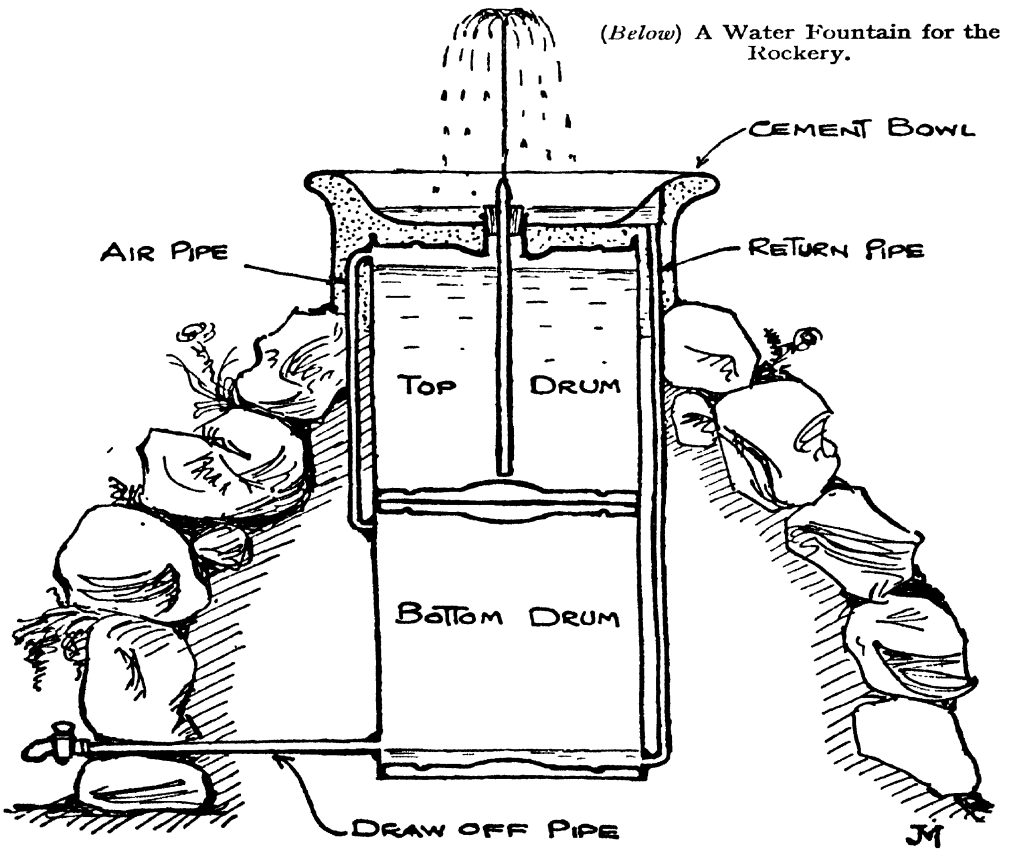
An ornamental fountain is an attractive addition to the garden, and some suggestions for constructing one are given here.

As seen in Fig. A it will be necessary to fit a strainer rose at the inlet end of the 2½ in. diameter pipe, and a valve immediately behind this. Another valve will be required at the fountain to regulate the height of jet, and a good idea would be to provide another valve by means of which the whole pipe could be scoured clear of weeds and silt which otherwise might accumulate and choke the standpipe.

Using the largest jet (¾ in.) it should be possible to obtain a spout of



(*Below*) A Water Fountain for the Rockery.



water 19 ft. high above the outlet of jet, and this height will be increased when using the smaller jets. Note the cup-shaped recess at the mouth of the plain jets or nozzles is designed to protect the true bore from any injury. The type of jet shown at Fig. B is known as the "Convolvulus" owing to its form of display, and very pretty effects can be obtained from this and the "Dome" or "Bell" jet, shown at Fig. C, with very low pressures and a small supply of water; one condition of their use is, however, that they can only be used in sheltered situations, wind destroying their artistic value entirely.

FOUNTAIN FOR ROCKERY

The illustration shows a simple but very effective rockery fountain of the Hero type, using two large metal drums or barrels each of about 50 gal. capacity concealed in the rockery. This type is very satisfactory provided both drums are made quite airtight. The water can be retained by means of a wind-driven pump, or a separate tap supply will be necessary.

FOUNTAIN, SELF-ACTING

The illustration in Fig. A and the notes following should enable the average handyman to construct an efficient self-acting fountain.

Referring to the illustration, it is important that both tanks be absolutely airtight, all pipes being soldered in place. Pipe C should not project into the bottom tank, but finish flush with top of same on inside; its top end should stop just clear of the top of top tank. It is also important that the bottom of pipe D should stop just clear of bottom of bottom tank, and draw-off cock should be arranged a little above this so that there is always a little water left to seal the return pipe after emptying the bottom tank. The bottom of jet pipe E should be made with nicks filed across its diameter so that it can be set to touch the bottom of tank and still allow water to pass.

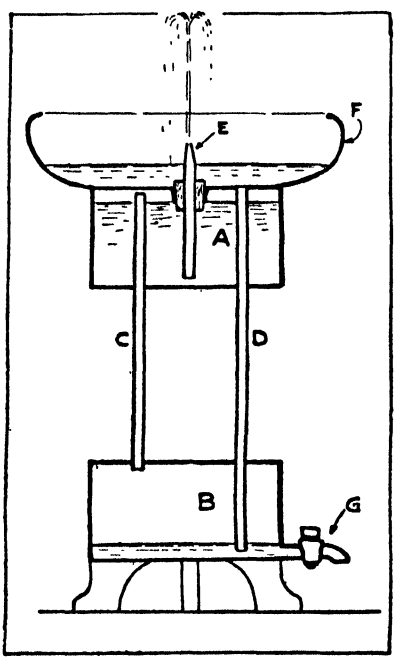


Fig. A.—Diagram of Hero's Fountain.

Table Fountain.—For a table fountain the dimensions may be scaled from sketch; tanks should be of copper or brass, the pipes being anything from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. in diameter, and the jet diameter about $\frac{3}{64}$ in. If properly constructed a fountain along the lines given should work for at least three-quarters of an hour, the height of jet of water decreasing as the water level is reduced in top tank.

To start the fountain (both tanks being empty), take out jet pipe and fill top tank with water, replace jet pipe and pour water into basin F, whence it will flow down pipe D into bottom tank, compressing the air there and starting the fountain, when no more water should be added to basin. The action of fountain will cease when top tank is empty, and it can be restarted by emptying bottom tank by draw-off cock and repeating the directions given before, the same water being used over and over again.

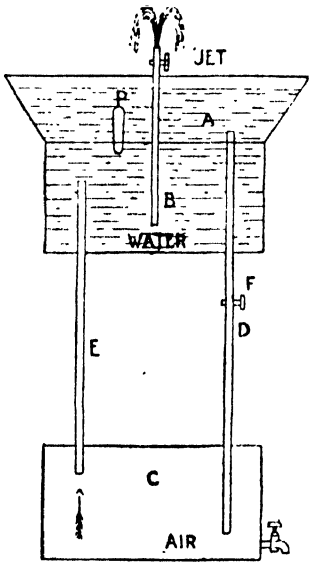


Fig. B.—Another Type of Self-acting Fountain.

Garden Fountain.—With regard to a fountain for use in the garden, this could readily be built by improvising two 10 gallon oil drums, coupling these up with $\frac{3}{16}$ in. or $\frac{1}{4}$ in. pipes (soldered in place), and having mounted one tank on top of the other and surmounted the top one with a cement basin the whole fountain could easily be arranged in a rockery where the tanks would not be seen.

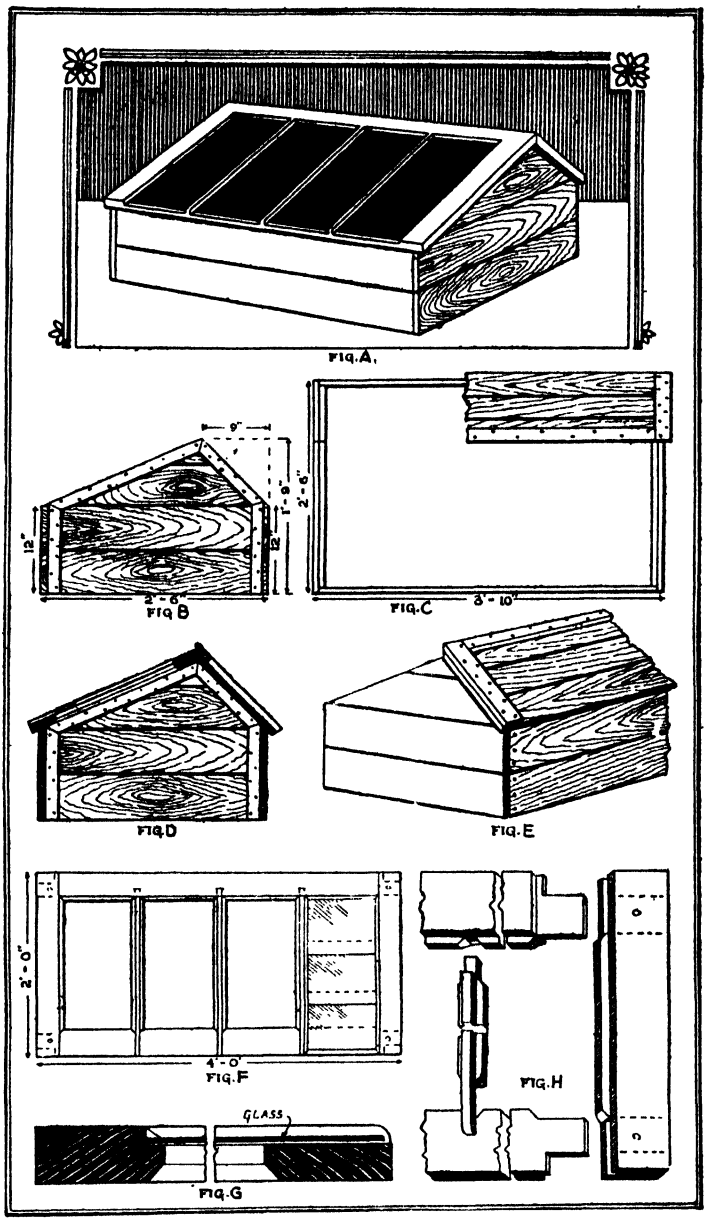
Another Design of Self-acting Fountain.—Fig. B shows another self-acting fountain. It works well, throwing up a stream equal in height to the distance between the cisterns marked A and B. These have no connection with each other apart from the jet pipe that runs into both of them. The top of B forms the bottom of A. In starting the fountain, take out plug P and fill cistern B, but let no water into C. When B is full, put in plug and fill A; now turn tap at F (or a piece of cork at top will do in A). The water will then rush down D into air chamber C, up through E into cistern B and up through jet.

FRAME

People living in houses with small gardens attached find it difficult to cultivate them with any degree of success without a frame, and to such the frame shown in Fig. A will be very useful. It is compact and occupies little space, but is large enough for the amateur gardener to raise all the seeds and cuttings he will require. The main dimensions are: length, 4 ft.; width, 2 ft. 6 in.; height, 1 ft. 9 in., and the construction should come well within the scope of the average amateur. The body of the frame is simple to make, but the glazed light is rather more difficult, and the cost will not be great as the work may be carried out entirely in deal.

The Framework.—The frame is made from $\frac{3}{4}$ in. boards, with plain or grooved and tongued edges, and the two ends should be made first to the dimensions shown in Fig. B. The boards are cut to shape and fitted together, and are held by nailing battens around the end and top edges. The battens should be $1\frac{1}{2}$ in. wide by $\frac{3}{4}$ in. thick, the end battens should

be kept ¾ in. in from the edges, but the top battens are fixed level with the edges. The boards for the front and back are cut 3 ft. 8½ in. long; they fit between the ends, and are nailed to the end battens. To complete the frame, a portion of the top is boarded in, the boards for this being cut 4 ft. long, and nailed to the top edges of the ends to overhang 1 in.; and to strengthen the work, battens 2 in. wide by ¾ in. thick are nailed to the top and end edges, as shown in Figs. C, D, and E.



A Handy Garden Frame to Make.

The Glazed Light.—The glazed light is framed up as shown in Fig. F, the framework consisting of two end rails 2 ft. long by 3½ in. wide by 1½ in. thick, a top rail 4 ft. long by 3½ in. wide by 1½ in. thick, three glazing bars 2 ft. long by 1½ in. square, and a bottom rail 4 ft. long by 3½ in. wide by 1 in. thick. To prepare the framework, the rails and bars should first be planed up quite square to the dimensions given. The end and top rails and the glazing bars are rabbeted ½ in. square at the inner top edges for the glass, and all the rails and bars are chamfered ½ in. square at the inner bottom edges, as shown in Fig. G. If care is exercised in setting out, the

work of framing will not be difficult, details of the joints being shown in Fig. H. Simple mortise and tenon joints are used, but they must be mitred in the depth of the rabbets and chamfers. The top rail is tenoned into the end rails, the bottom rail is also tenoned into the end rails and is kept level at the bottom edges so that the glass will fit over it as shown in Fig. G, while the glazing bars are tenoned into the top rail and lapped over the bottom rail. Wood pins are used to fix the joints, and the lapped parts of the glazing bars are nailed to the bottom rail.

Glazing and Finishing.—The light may be glazed with small pieces of glass, say three pieces to each opening, so that in case of breakage only one of the pieces may need to be renewed. The glass should be bedded in oil putty and sprigged. The light is hinged to the top of the frame, and should be fitted with an iron stay for the purpose of ventilation.

When complete, the frame should be painted two or three coats of lead paint.

GARAGE DOOR STOPS

Whilst the usual hasp and staple fastening method is quite effective for garage doors it is often somewhat inconvenient in use. In order to overcome this drawback a simple device can readily be fitted to the post which holds the staple (or hasp) although it will necessitate moving the foot post to another position. However, the device is so easy to use that this is well worth the trouble.

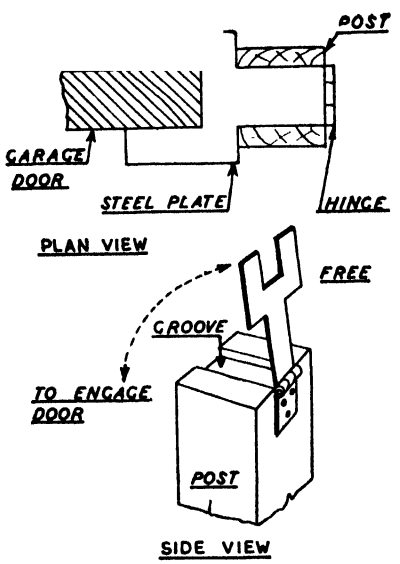


Fig. A.—Novel Type of Garage Door Stop.

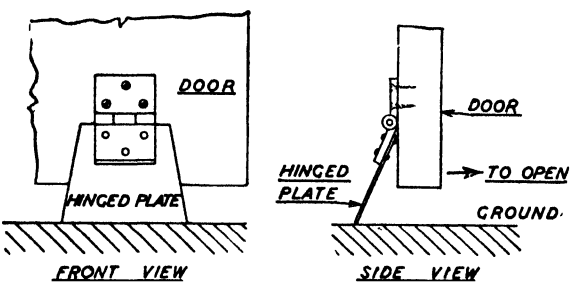


Fig. B.—Another Garage Door Stop.

Referring to Fig. A, this shows a hinged metal plate cut to the shape shown in the plan view, fitted by means of a hinge to the top of the post. When in use the plate swings over and holds the edges of the door. The dotted position shows how the plate is released; this can be done, even in the dark, with the hand or foot.

Fig. B shows how a strong door hinge and metal plate or oak post can be used to keep a garage door open. It is screwed to the inside of the door and is quite free all the time the door is opening, but acts like a ratchet

and pawl device to prevent the door from closing. If a wooden post be driven into the ground with its top flush with the surface and a plate be screwed on to the top for the door stop to engage, the latter will not injure the drive and will ensure a permanent stop. The door is opened a little farther, and the stop pulled up when it is necessary to close it.

GARAGE, MADE OF TIMBER

The accompanying drawings illustrate a motor garage suitable for an average-size car.

Foundations and Floor.—Commencing with the floor and foundations, the first operation is to excavate the whole area of the building to a depth of, say, 6 in., and thereafter dig out the tracks for the concrete foundations, which are 10 in. broad by 9 in. deep. These tracks are taken out all round the building with the exception of the portion at the door. Lay down bottoming composed of broken bricks or stone inside the area formed by the wall tracks, and to within an inch of the ground level. For the concrete above the ground, boarding, 3 in. deep, is fixed by means of pegs driven into the ground, the boards being afterwards removed when the concrete is set. The floor is filled in with concrete to a thickness of 4 in., the foundations being filled in at the same time. The concrete is made of 4 parts of bricks or stone, broken to pass through a 2 in. ring, 2 parts of sand and 1 part Portland cement, well mixed together with water. When filling in the concrete fix $\frac{5}{8}$ in. M.I. bolts about 12 in. long, with a $\frac{1}{4}$ in. thick plate 4 in. by 4 in. at the bottom, and nut and washer at the top. These bolts are taken through the bottom rail of the building and should be inserted at 3 ft. centres.

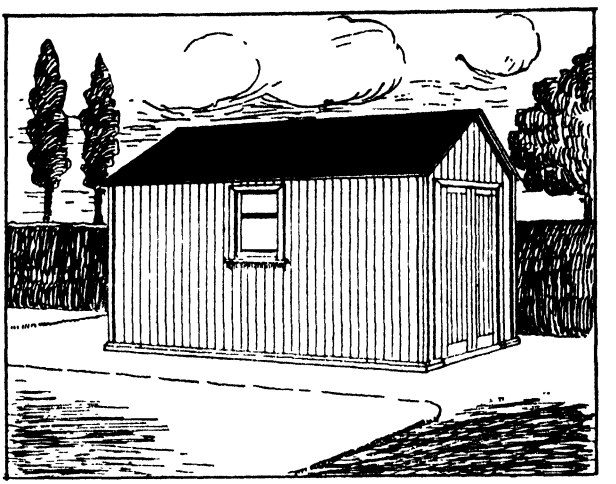


Fig. A.—The Completed Motor Garage.

The splay shown on the base need not be formed unless desired, but the floor would require to be laid with a fall towards the door so as to provide easy access for the car. The finishing coat on the floor is 1 in. thick, composed of 1 part cement to 2 parts sand, and a coating of this mixture should be put on the exposed portions of the concrete foundations.

The Framework.—Dealing with the superstructure, the corner posts can either be 4 in. by 4 in. or two 4 in. by 2 in. battens spiked together. These posts are stub tenoned into the top and bottom rails, which, with

the exception of the rail above the door, are 4 in. by 2 in., and half-checked at joinings as shown in the detail provided.

The intermediate posts are all 4 in. by 2 in., except those at the sides of the windows which are 4 in. by 3 in. These posts are checked into the top and bottom runners. The middle rail is 4 in. by 2 in., whilst the rails forming the lintels of the windows are 4 in. by 3 in. These rails are

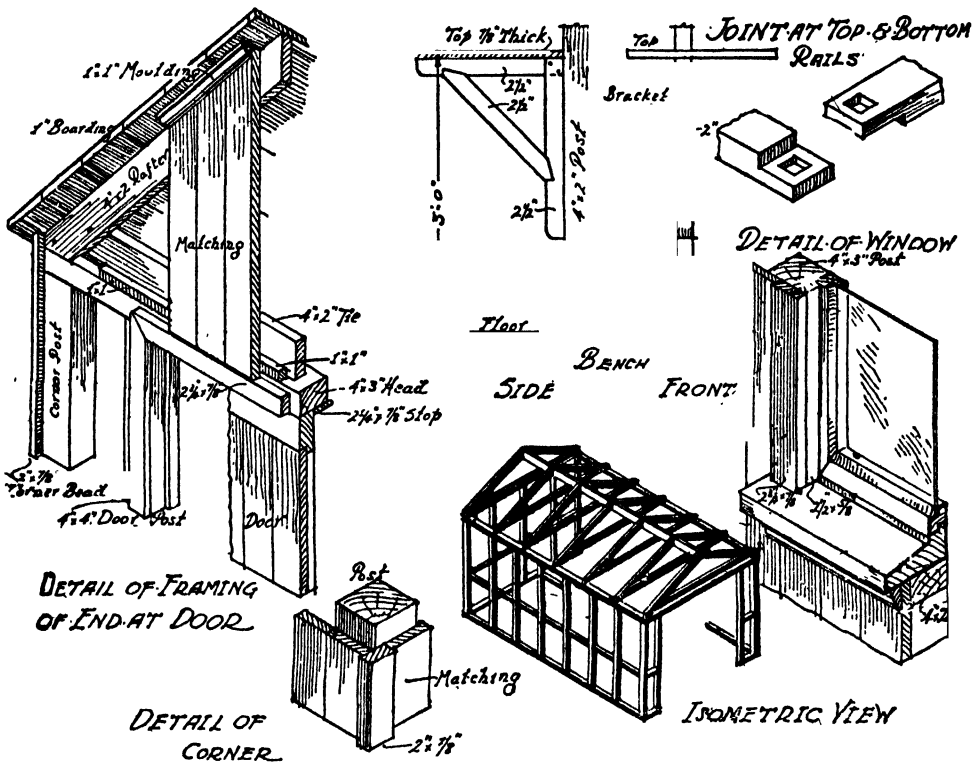


Fig. B.—Constructional Details of Motor Garage.

also checked and spiked into the posts. The doorposts are 4 in. by 4 in. with a 4 in. by 3 in. lintel.

At the corners of the building, beads 2 in. by $\frac{7}{8}$ in. are nailed for the purpose of forming a neat finish to the matching; and run up the sides of the building until they butt against the under side of the roof boarding. The roof is framed up with 4 in. by 2 in. rafters at 18 in. centres, bevelled and spiked to a 6 in. by $1\frac{1}{4}$ in. ridge board; they are also bevelled at the eaves and nailed to the top rail as shown in the enlarged section of the building.

The ceiling joists or ties are 4 in. by 2 in., bevelled at ends and nailed to the rafters; whilst the roof is covered with 1 in. boarding which projects 3 in. at the eaves and 4 in. at the gables. Note that at the rafters forming the gables the ceiling ties are nailed to the inner side of the rafters.

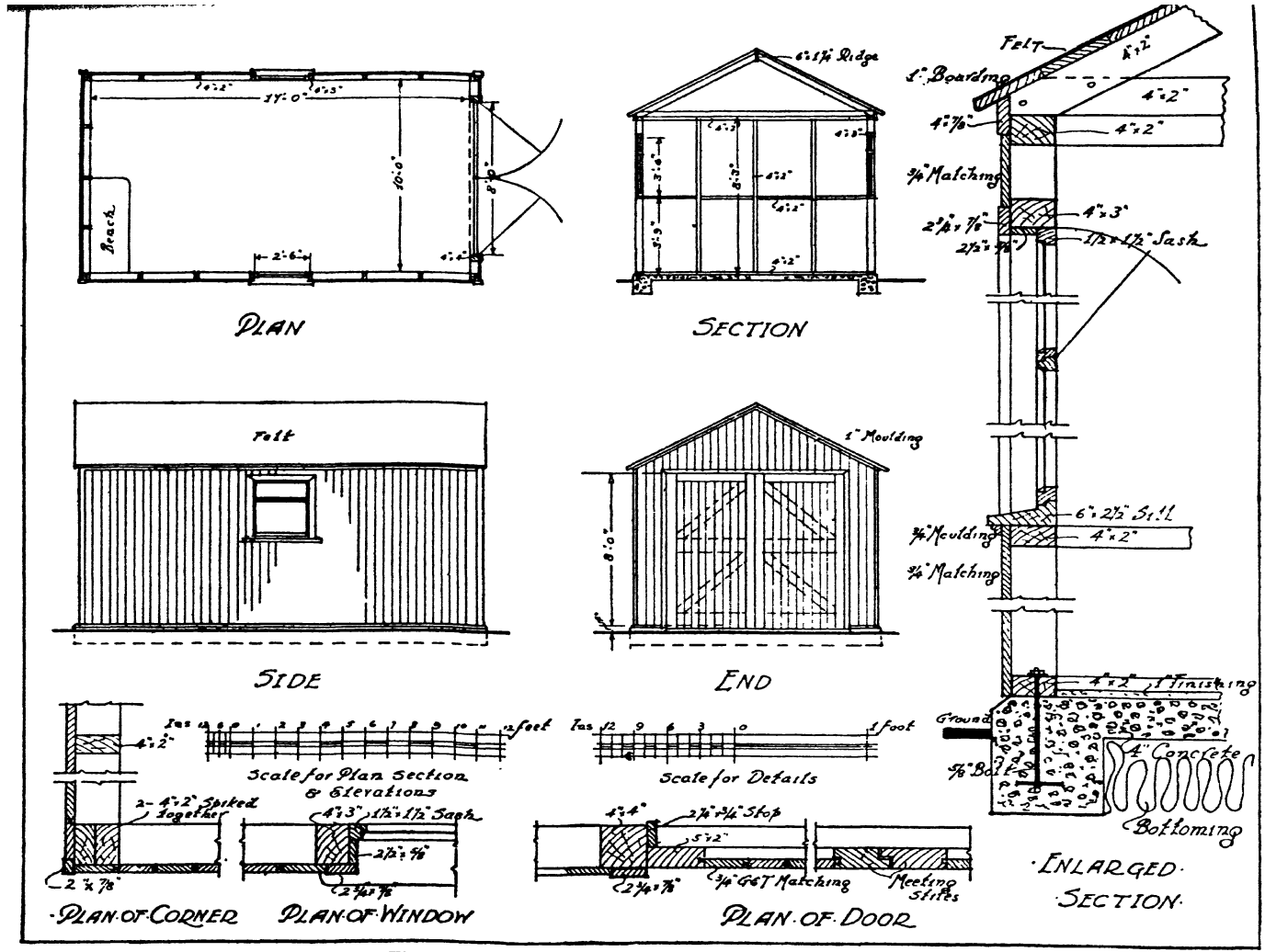


Fig. C.—Dimensions and Working Drawings of Garage

Roof, Door, and Windows.—After the boarding is in position, it is covered with roofing felt lapped where the sheets join, and nailed every 3 in. The felt is carried round and over the edges of the roof boarding where it projects at the eaves and gables, while a strip of felt is folded over the apex of the roof and nailed down to form a covering for the ridge. At the gables a 1 in. by 1 in. fillet is nailed to the top of the top rail, as illustrated in the detail of "Framing of End at Door" (Fig. B). This fillet is for the purpose of nailing the matching to above the doorway.

The window is formed with a 6 in. by $2\frac{1}{2}$ in. checked and weathered sill with a $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in. sash, the transom being checked to allow the top half of the window to open. Stops $2\frac{1}{2}$ in. by $\frac{5}{8}$ in. are nailed to the inner sides and along the under sides of the lintels of the windows, while $2\frac{3}{4}$ in. by $\frac{7}{8}$ in. facings are nailed round the outsides of the window openings, these plates being mitred at the corners and butted on to the sills. Under the latter is sprigged a $\frac{3}{4}$ in. moulding which should be returned at the ends.

The door shown is of the framed and lined type, hinged to open out, and is 2 in. thick. The lining is $\frac{3}{4}$ in. thick; the stiles and top rail 5 in. by 2 in., with 8 in. by $1\frac{1}{4}$ in. middle and bottom rails, the braces being 6 in. by $1\frac{1}{4}$ in. Door stops $2\frac{1}{4}$ in. by $\frac{3}{4}$ in. are fixed on the inner faces of the posts and along the under side of the lintel, whilst $2\frac{3}{4}$ in. by $\frac{7}{8}$ in. facings, mitred at the angles, are nailed round the front of the opening.

It might be advisable for the amateur to purchase the door and windows ready made, as these are really the most difficult parts of the structure to make.

The Matching and Finishing.—The framework of the building is covered with $\frac{3}{4}$ in. matching, grooved and tongued. This matching butts against a 4 in. by $\frac{7}{8}$ in. plate carried along the sides at the eaves, and at the gables the matching is finished against the under side of the roof boarding by means of a 1 in. by 1 in. moulding as depicted on detail of "Framing of End at Door" (Fig B).

A small bench is erected at one end of the garage, the top being 21 in. broad, supported on brackets spiked to the posts and on a fillet screwed to the side.

The exposed timbers should be all of red pine, the remainder being white pine, and it might be coated with "Solignum" or given three coats of oil paint.

The construction of the building is very fully illustrated and should present no difficulty to anyone used to handling tools.

GARAGE KERB BOARDS

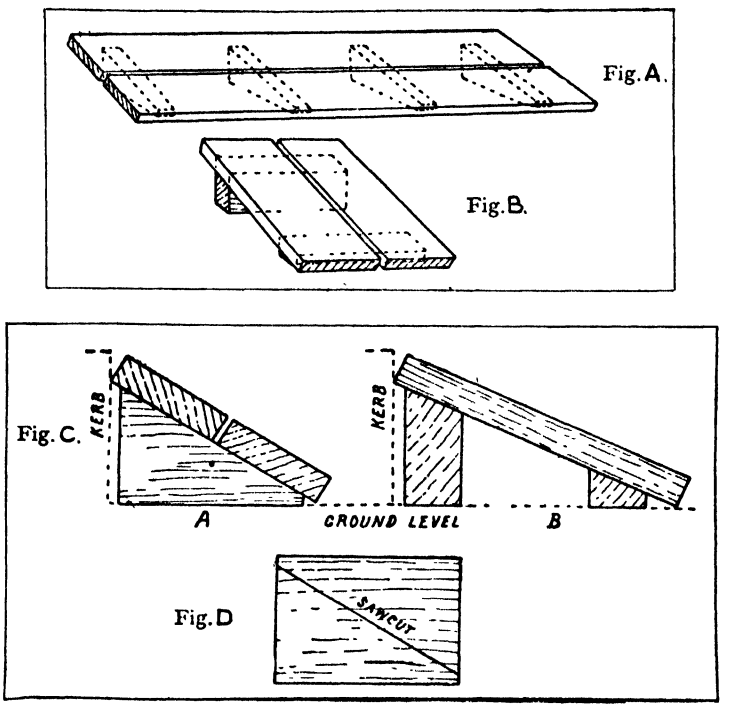
In cases where the pavement outside a garage is not laid as a ramp, it is necessary to provide wooden kerb boards for use in getting the car into or out of the building.

The simplest way to do this is to get a piece of wood of suitable length and thickness and bevel its top outer angle with a plane, but generally a

board for the purpose is built up by one of the methods shown in Figs. A and B. The first shows the board running longitudinally with wedge-shaped blocks nailed to its under surface; the second has short lengths of board running the other way with cross-blocks beneath to suit the slope. The difference between these two methods is in the direction of grain of the parts. That in Fig. A is generally more suitable where considerable length is wanted, while that in Fig. B is better for the short length shown, especially if the kerb or step is deep or if a long slope is preferred. It would do for a motor cycle, but two such boards would be wanted for a four-wheeled vehicle.

If the board cannot be left in its position permanently, a pair of the small ones shown in Fig. B are less troublesome to carry about.

In the illustrations, both are shown with upper surfaces of two pieces of board edge to edge with an open joint. This is not an essential detail of the construction: it may be in one width or in three or four widths, depending on the wood available and the total width required. In work of this sort the joint is left slightly open to allow for possible swelling in wet weather.

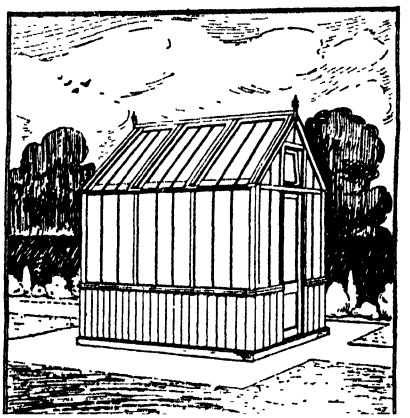


Method of Constructing Garage Kerb Boards.

The upper board should not be less than 1 in. thick, and the transverse pieces beneath not less than 2 in. thick. End views are shown in Fig. C. Fig. D shows the most economical way to cut the wedge-shaped blocks for Fig. A, a pair of blocks being obtained from a rectangular piece. The angle of slope should generally not be steeper than 30° with the horizontal. In Fig C, A is at this angle and B is slightly less.

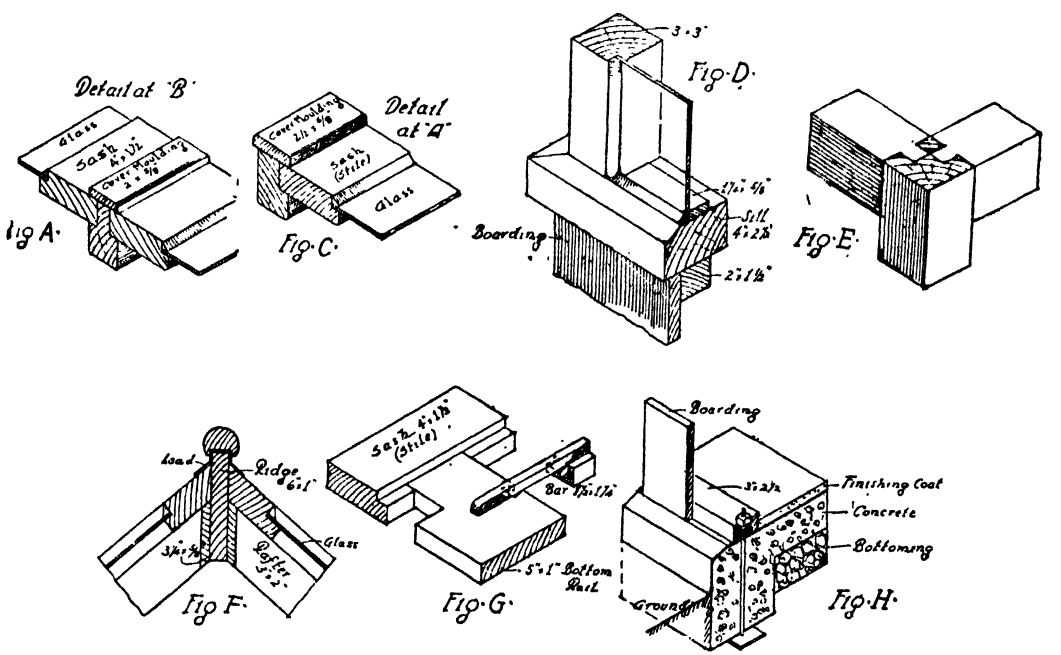
GREENHOUSE

The accompanying drawings illustrate a scheme for a small greenhouse which can easily be carried out by anyone handy with the tools.



The Finished Greenhouse.

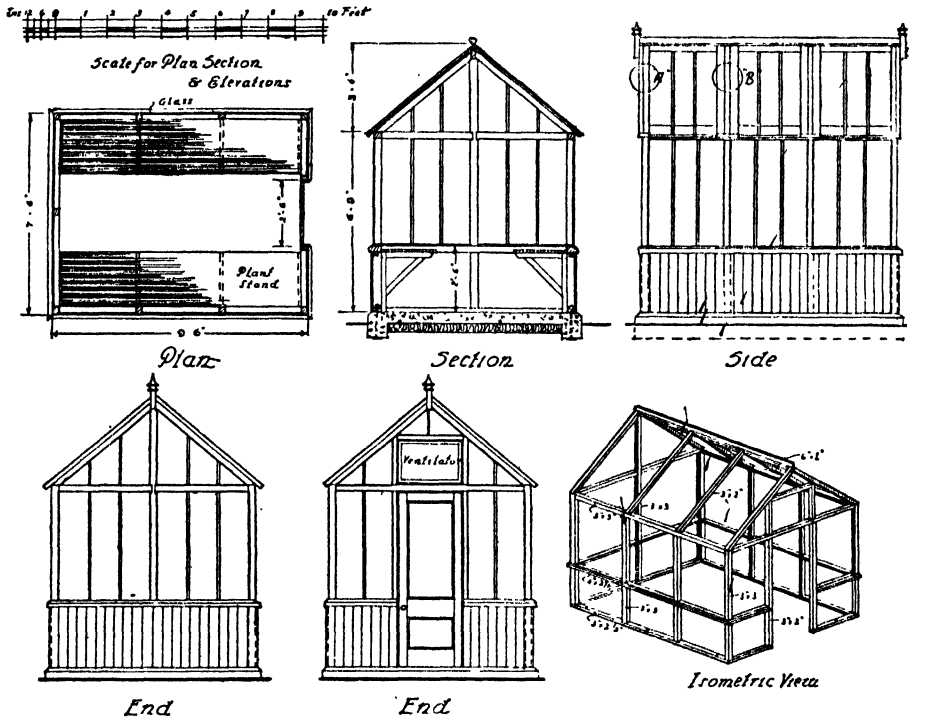
Concrete Foundations.—It will be observed that the building, as shown, is bolted to a concrete foundation, and has a concrete floor, but, although this method of erection makes by far the better job, the provision of such a foundation is not absolutely necessary, as, after the site has been levelled and the earth rammed down, a few bricks can be sunk into the ground under the bottom rail, and the building set thereon. Should, however, the concrete foundation be preferred, the work is carried out according to the method illustrated in Fig. H. The concrete is composed of 4 parts broken bricks or stone to pass a 2 in. ring, 2 parts sand, and 1 part cement, whilst the finishing coat for the floor, which is $\frac{3}{4}$ in. thick, is composed of 1 part cement to 2 parts crushed granite. Holding-down bolts, $\frac{5}{8}$ in. diameter, are set at about 4 ft. centres into the



Details of the Joints, Glazing, etc.

concrete foundation when it is being laid, and these bolts are screwed at the top for the nuts, and have $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $\frac{1}{4}$ in. thick plates at the bottom.

The Framework and Door.—Dealing with the building, the framework consists of 3 in. broad by 2½ in. thick bottom rails, half checked at the corners and mortised to take the stub tenons of the corner posts, the latter being 3 in. by 3 in. The top rails are also 3 in. by 3 in. tenoned into the posts, as shown in Fig. E. These joints are fixed with white lead and pinned. The sill is 4 in. broad by 2½ in. thick, weathered on top, tenoned into the corner posts and mitred round same. Supporting the sill are short posts, 3 in. by 3 in., which may be notched and nailed to the bottom rail, and the sill, or simply nailed to these members.



Constructional Views and Dimensions of Greenhouse.

The posts above the sill are 3 in. by 3 in., and are stub tenoned into the top rail and sill, the joints being fixed with white lead. The door posts are 3 in. broad by 2 in. thick, stub tenoned into the top and bottom rails. Under the sill are nailed lengths of 2 in. by 1½ in. stuff, to which is fixed the 4 in. by ¾ in. grooved and tongued matching, whilst on the top of the sill a 1¼ in. by ⅝ in. fillet is nailed to hold the glass. A detail of the construction is given in Fig. D. The astragals are 1¾ in. thick by 1 in. board, tenoned into the top rail and sill, and checked for the glass, which is 21 oz. sheet glass. The posts and top rails are also rabbeted for the glazing. The door may be purchased second-hand, and door stops are required to keep same in position, whilst

ventilation is provided by means of an opening fanlight above the door.

The Roof.—The roof is constructed of 3 in. deep by 2 in. broad rafters spiked to the top rail above the posts and to a 6 in. deep by 1 in. thick ridge plate. The rafters are checked $\frac{5}{8}$ in. broad by $1\frac{1}{2}$ in. deep to take the sashes forming the roof, these being screwed into the checks and also to bevelled pieces cut out of $3\frac{1}{4}$ in. by $\frac{5}{8}$ in. stuff, the latter being screwed to each side of the ridge plate, see Fig. F. The roof sashes are framed up with 4 in. broad by $1\frac{1}{2}$ in. thick stiles and top rails, the bottom rail being 5 in. broad by 1 in. thick, tenoned to the stiles by means of a bare-faced tenon. The stiles and top rails are checked for the glazings, as are also the $1\frac{1}{2}$ in. deep by $1\frac{1}{4}$ in. thick astragals. These astragals are stub tenoned into the top rail, but at the foot are taken right over the bottom rail, the thick portion of the astragal being cut away to allow the glass to pass right over the bottom rail instead of resting in a check or rabbet. The astragals are dovetailed into the bottom rail, as shown in Fig. G. After the sashes are in position, a cover fillet is screwed to the top of the rafters, so as to prevent the weather getting in between the points of the sashes and the rafters. Details of this part of the roof are given in Figs. A and C, the former illustrating the finish at the intermediate rafters, and the latter at the end rafters, the fillet in this instance projecting $\frac{1}{2}$ in. beyond the face of the rafter. A 5 lb. lead flashing is nailed over the ridge plate, and batted over the top rail of the roof frames, whilst a 2 in. diameter ridge roll undercut to fit the ridge plate is screwed to the latter and the roof completed by nailing two small finials to the apex of the roof at the ends.

Plant Stands.—Plant stands, formed of slats nailed to brackets and fillets and fixed to the framing, complete the structure.

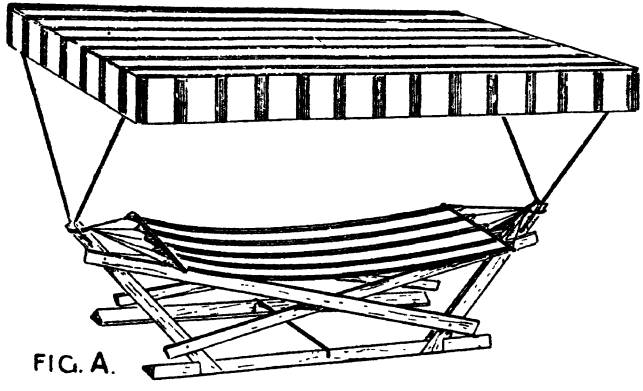
All exposed timber is red pine, with the remainder white pine, the building receiving three coats of oil paint when erected.

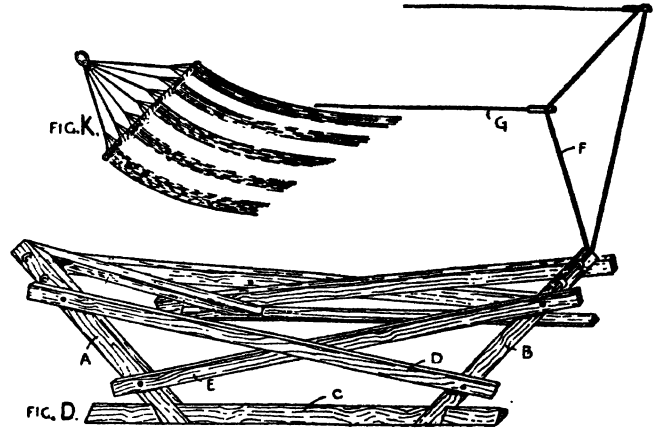
HAMMOCK

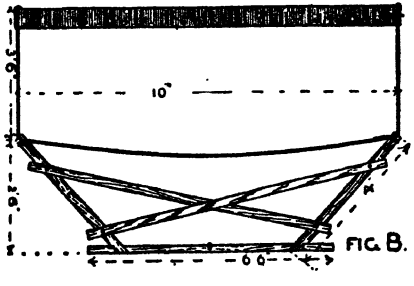
The hammock support shown at Fig. A is designed for use in a garden where it is not possible to make use of trees or posts conveniently situated for slinging a hammock. It will be seen in the side elevation at Fig. B that the hammock is slung on the projecting ends of the framework.

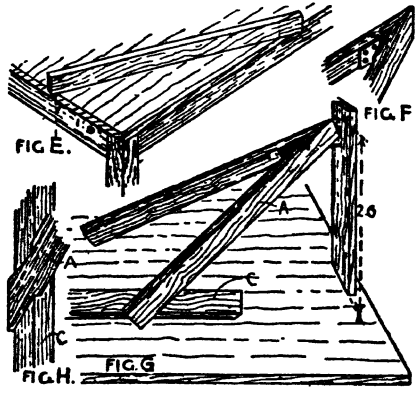
The awning is supported by an iron framework attached to the ends of the frame as shown in the end elevation at Fig. C and in the diagram of the completed framework at Fig. D.

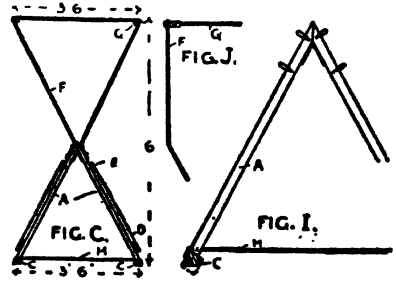
Constructing Wooden Frame.—Begin by making the two end pieces, A and B, these being composed of two 4 ft. lengths of $2\frac{1}{4}$ in. by $1\frac{1}{4}$ in. machine-planed deal, or if an extra strong support is required, oak or similar hard wood. The two pieces for each end are hinged together with back-flap hinges, the top of the pieces being marked off and sawn to the correct angle. The easiest way of marking off the angle is to mark off 1 ft. 9 in. from the corner of a square table and place the lengths











Constructional Details and Dimensions of Garden Hammock.

in turn on the mark as shown at Fig. E. When the pieces are sawn to the line, place the sawn edges together, measure the distance across at the bottom to make sure that it is 3 ft. 6 in.; then fit the hinges in as shown in the detail at Fig. F and screw them on. The next job is to prepare the two bottom pieces as at C (these are 6 ft. 6 in. by 2 in. by 2 in.) and join the ends to them. For marking the position of the dovetails, the table should be used again as shown at Fig. G. Take one of the hinged ends, support it against a strip of wood at a height of 2 ft. 6 in. and drive a nail in the support so that the top of the hinged end will remain at this height. Measure off 12 in. along the bottom pieces C, and place them on the inside of the end lengths as shown and then mark off the slope with a pencil. The dovetails are cut on the ends of the pieces, placed on the bottom pieces as shown in Fig. H, the slots cut in the latter pieces, and then the pieces are fitted together. The next job is to mark off the slope on the bottom of the bottom pieces as indicated in Fig. I and plane down to give a horizontal surface. The joints are now glued up and the two stays D and E, approximately 8 ft. long, prepared from 2 in. by 1 in. wood, screwed on. The top screws are about 15 in. down and the bottom ones about 12 in. up from the bottom of the joints.

Iron Frame for Awning.—The next stage of the work is to provide the iron framing for the awning; this is shown at F and G in Fig. C in end elevation, in Fig. D, and in Fig. J. For the end pieces the triangular frames are made from $\frac{1}{4}$ in. round rod, but the connecting lengths are of brass tube fitting into short lengths of tube soldered to the top inner corners of the frame. For each frame provide two 12 ft. lengths of rod, mark off 9 in. from the ends, then 3 ft. 6 in. along from each mark, leaving a similar distance in the centre. The rod is now placed over a gas flame at each mark and then bent to the angles shown; this job is not difficult with $\frac{3}{4}$ in. iron. The two lengths of brass tube are fitted with 4 in. lengths of tubing just large enough to slide on, and when the inner corners of the iron frame and the ends of the short length of the tube have been filed bright and tinned, it will be a simple matter to solder them in position. The ends are now fitted into screw eyes driven into the top of the bottom projecting ends A and B (Fig. D). The connection for A is also shown in Fig. I.

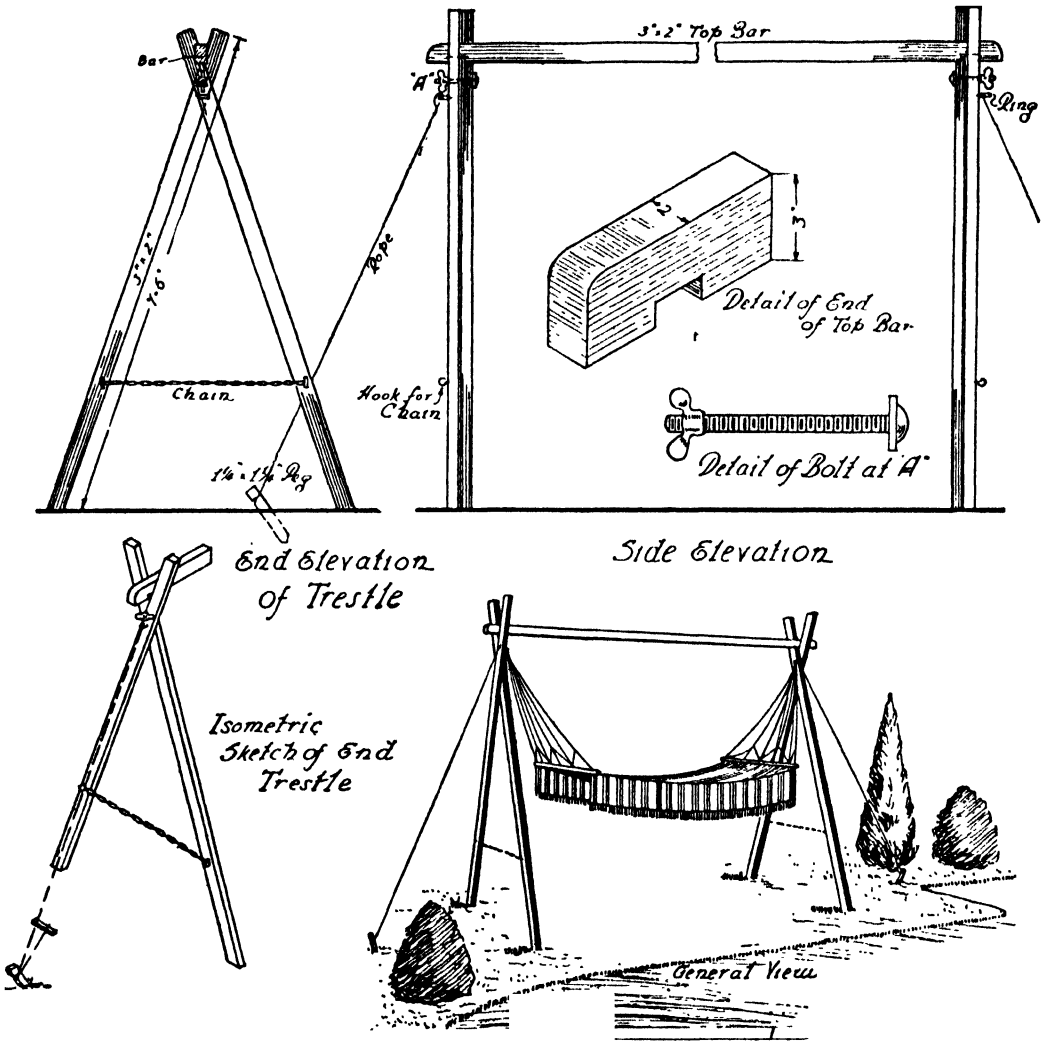
The Awning.—The awning is made from striped canvas as indicated; the top should be 11 ft. long to allow for the sides and the width 3 ft. 6 in., with two strips 6 in. wide sewn on and joined up with the ends.

To prevent the frame from spreading if placed on loose ground, it is an advantage to fit a length of iron rod, suitably bent at the ends, across as indicated at H.

The Hammock.—The hammock is the only remaining fitment, and this can be made of striped canvas securely nailed to suitable lengths of $1\frac{1}{2}$ in. round wood and fastened to a rope loop with lengths of cord as indicated in Fig. K.

HAMMOCK STAND, PORTABLE ALTERNATIVE TYPE

A hammock is a very desirable and useful construction for the garden, and, where there are no convenient trees to which it may be slung, a portable stand in the form illustrated can be easily made at little expense.



A Portable Garden Hammock.

The stand comprises two ends made up in trestle-form with a top bar connecting the two. This bar has a check about 4 in. long by 1¼ in. deep cut out on the under side at each end to prevent the bar slipping away from the ends. The distance between the trestle ends will vary according to the length of the hammock, but should be somewhere about 10 ft.

Red pine, cut to the dimensions given, is used in the construction of the frame, and the whole should be given three coats of paint in a pleasing shade of green.

The legs of the trestle ends are secured where they cross by means of ⅜ in. diameter bolts 6 in. long, with washers and wing-shaped nuts, whilst the hammock is slung from strong hooks screwed into the inner side of the trestles.

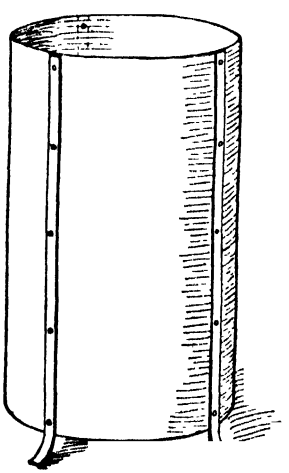
To connect the two legs of each trestle, a stout piece of chain is fixed at one end to an eyelet screwed to one of the legs, the other end of the chain being left loose so that it can be slipped over a hook screwed to the remaining leg.

Iron rings, to which the stay ropes are tied, are also screwed to the legs near the top of the frame, the ropes being fastened to pegs driven into the ground, in a similar manner to tent pegs.

As the stand is portable it can be disassembled when desired and stored away.

INCINERATOR, BRICK TYPE

A quite simple and readily made incinerator can be built up from bricks. First mark out a circle of, say, 18 inches diameter on the ground. Then arrange a layer of bricks on the ground, with spaces of about 2 inches between them. The bricks should be laid flat, not edgewise, and with their longer sides touching the circle, the other longer sides being *outside* the circle. Then lay another row of bricks over the first, but with their flat sides covering the 2 inch spaces of the first row bricks, i.e. staggered. Continue to lay successive staggered rows, reducing every other row in length by one brick if you desire a conical incinerator. The height should be from 18 in. to 24 in., according to the required capacity. The weight of the bricks will keep the incinerator firm. The various spaces between the bricks act as vent or air holes and give an excellent draught at all times.



An Efficient Garden Incinerator.

INCINERATOR, METAL TYPE

An efficient incinerator for the disposal of house and garden refuse can be constructed in the following manner. Procure a sheet of iron 6 ft. by 3 ft. and not less than 24 gauge thickness. Also three lengths of strap iron 3 ft. 6 in. by 1 in. by ⅛ in. Bend the sheet, bringing the shorter edges together, thus forming a hollow cylinder. Lap these edges 2 in., and make a number of rivet holes in a line along the centre of the lap. Bend one end of each length of strap in the form of a quadrant of 3 in. radius. Drill holes to correspond with those in the sheet and rivet together with the lap of the cylinder. Rivet

the remaining two straps at equal distances around the circumference, as shown in sketch. The result is a flue raised by its feet about 4 in. from the ground. If this be filled lightly with the clearings from the garden, together with old newspapers, etc., and lighted, the rubbish can be completely burnt much more quickly than in the usual method of a heap on the ground. The draught created by the space at the base causes the smoke to be carried away instead of spreading along the ground. A large quantity of refuse can be dealt with in this way if it be fed into the top as it burns. The ash is an excellent fertiliser.

PERGOLA

The pergola shown at Fig. A is composed of a number of uprights fixed in the ground and connected at the top with lengths of wood. A portion of the construction, with the necessary dimensions, is shown at Fig. B. Each of the uprights is made with two upright posts A and B, joined together with nine strips; five are short lengths as at C and D, one is

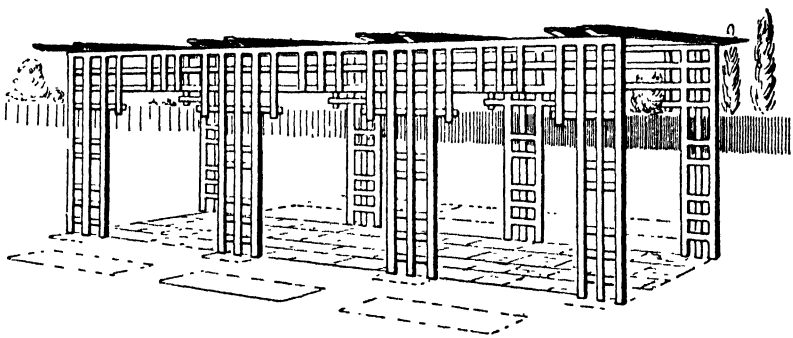


Fig. A.—Showing Appearance of Finished Pergola.

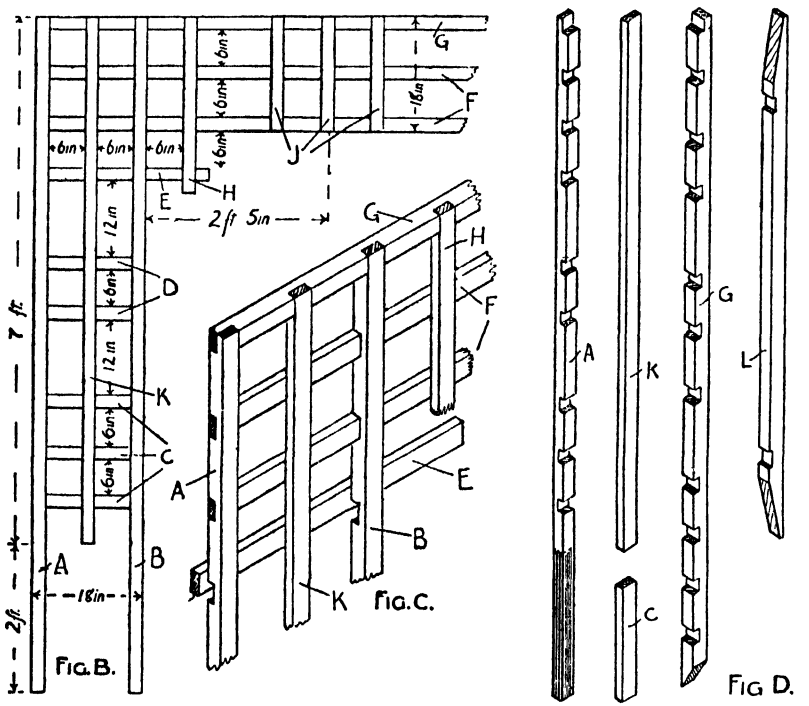
longer as at E and three are used to connect up with the next upright as at F and G. A length H, similar to E, connects up this piece with the top lengths F and G, and short lengths J, similar in length to those at C and D, are used to join up the long lengths at F and G. A length K joins the strips C, D, E, F, and G, between A and B.

Chief Dimensions.—The quantity of wood required depends on the length and width of the pergola, but this can be estimated when the quantity required for one upright and one connecting length is known. The two uprights A and B are 9 ft. long by 2 in. by 2 in., the strips C, D, and J are 18 in. by 2 in. by 1 in. Those at E and H are 2 ft. 4 in. by 2 in. by 1 in., the two long strips F are 2 in. by 1 in., but the top length is 2 in. by 2 in. The distance between the outer post A and the corresponding post of the next upright is 6 ft. 4 in., but these lengths should be as long as possible and joined to the next at convenient positions.

Construction.—The method of joining the various lengths is shown at Fig. C, the parts being marked to correspond with Fig. B. Begin by placing the lengths A and B together, and mark out the position of the grooves

as at A, Fig. D. Half the thickness of the wood is cut out in all the grooves, and from the top the measurements are 2 in., 6 in., 2 in., 6 in., 2 in., 12 in., 2 in., 6 in., 2 in., 12 in., 2 in., 6 in., 2 in., 6 in., 2 in. These marks are marked across with a try-square, and gauged half-way down each side. In sawing out the grooves, care should be taken to keep the saw-cut on the inside of the lines, and to cut out the waste with a chisel level with the gauge lines.

The cross-strips C, D, and E are now nailed in the grooves, and then the other uprights should be made in the same way. The next job is to prepare the top lengths G, as shown in Fig. D; the grooves are set out as



Constructional Details of Pergola.

follows : 2 in., 6 in., 2 in., 6 in., 2 in., 6 in., 2 in., 12 in., 2 in., 6 in., 2 in., 6 in., 2 in., 12 in., 2 in., 6 in., and so on; the last measurement carries the length to the next post. The grooves should be continued as far as the length will allow and then the end should be cut off, as shown, and the next length joined to it so that the grooves can be continued. The top length is now nailed to the top of the uprights, and the two lengths F nailed on below. The lengths H and J are now nailed to the lengths underneath and the upright length K nailed to all the strips between the upright posts A and B.

The wood is now treated with a wood preservative or with creosote, and the 2 ft. at the bottom of the lengths A and B coated with tar or pitch.

Erecting the Woodwork.—The position of the holes in the ground is now marked out with a line, and dug out 2 ft. deep, and then each side can be placed in position, supported at intervals with suitable lengths of wood. The top lengths L, as shown at Fig. D, are now prepared to 16 in. longer than the inside distance between the two long sides of the pergola, the grooves are 2 in. wide and ½ in. deep, a length being nailed on the top of the posts A and B, and two more over the two outer pieces at J. These lengths should of course be treated with the same material as used for the rest of the wood.

The Pathway.—The path inside the pergola may be gravelled, but stone slabs look more effective. A simple and inexpensive method of providing slabs is to cast them in concrete; make a frame round a board to give an inside space of about 18 in. by 12 in. by 1¼ in. or so deep, several being made to save time, and fill with concrete. A suitable mixture is made by using coarse gravel, 4 parts; clean sand, 2 parts; and Portland cement, 1 part. The gravel and sand should be thoroughly mixed first, then the cement added and mixed, finally water is poured on to it, with a rose attached to a watering-can, and the mass turned over with a spade until it is of a suitable consistency to pour off the spade. The slabs should be left for a day or so to harden off, covering them with a piece of sacking.

POST ERECTING

Two things are required to keep a post upright, one that it shall be sunk into the ground to a sufficient depth, and the other consisting in thoroughly consolidating the soil around the post. Some form of reinforcement is necessary in loose soil, and in fibrous or peaty soils probably stability can only be secured by the use of some form of strut or similar support, there being a wide base provided for the support.

In the ordinary way a post set to any depth would be set against the solid soil, as shown in Fig. A, and by very firmly ramming the filling which is shown by the darker shading.

Where a reinforcement is necessary, about the simplest is indicated in Fig. B, the supports being pieces of 9 in. by 3 in. deal (or other wood) about 4 ft. long, nailed to the post in the way shown. When rammed up firmly even in light soil this method offers considerable resistance to stress, and if the soil is practically sound will stand against a steady pull, although not against excessive vibration, as this causes the soil to shift.

Roughly, in spongy, fibrous soils where struts have to be used the method adopted would be as shown in Fig. C, the exact arrangement depending upon the soil in which the poles have to be set up. In some cases it is not possible to secure absolute firmness owing to the character and depth of the spongy soil, but for many purposes a fairly stable arrangement can be secured.

Suitable Woods.—For most purposes either oak or sawn larch is best for fence and gateposts, etc. For wireless masts and the like, good red larch from a close plantation, where the trees have been starved

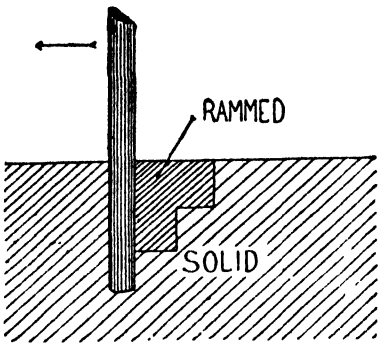


Fig. A.

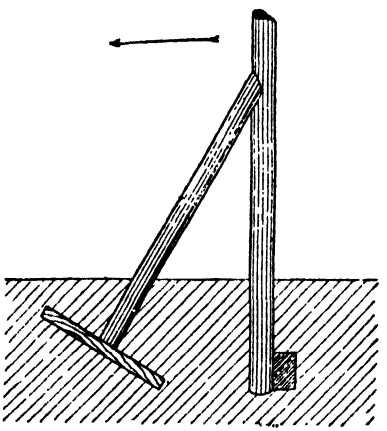


Fig. B.

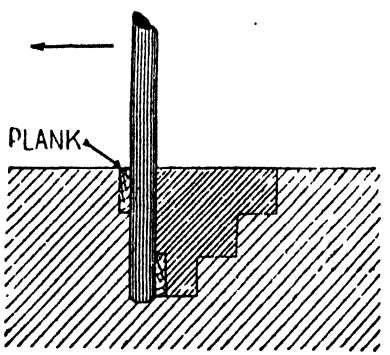


Fig. C.

Three Alternative Methods of Post Fixing.

through overcrowding, is best; when dry a dressing of either Solignum or Stockholm tar and solvent naphtha in about equal parts should be applied so that the wood is well soaked. The butt ends of the poles should either be soaked in the tar and naphtha solution until thoroughly saturated to a couple of feet above the ground line, or adequately treated with Solignum for the same distance, before they are put into the earth. Liquids which do not penetrate the wood, such as gas-tar, black varnish and the like, have little preservative value (particularly underground), as the moisture gets between the dressing and the wood, causing decay, which is not readily seen. A saturating dressing of raw linseed oil, allowed to oxidise naturally, forms as good a protection as paint at a less cost, although it "dries" slowly and has no ornamental appearance.

Wet Soils.—In wet soils, wood steeped in lime water for a week or more, and then dried for a week and again steeped in a 5 per cent. to 10 per cent. solution of commercial sulphate of copper for a fortnight or more and partly dried before being planted in position, becomes, for all practical purposes, rot proof, while if sulphate of iron is used instead of the copper salts, a somewhat less durability is secured. The wood in time becomes more or less brittle, however, owing to changes which set in.

Protecting Posts in Ground.—Unless well protected, the underground parts of wooden structures and fences will rot quickly.

Charring the ends of posts before sinking in the ground is a good protective measure. Another excellent method is to heat a bucket of tar and to dip the post ends in the hot liquid, allowing it to soak in and to dry as much as possible. Solignum and creosote are also good preservatives, if used liberally, and with repeated application.

An excellent method of preserving both wooden and metal posts that have to stand in the ground for very long periods consists in thickly coating them with a mixture of 1 part Portland cement and 3 parts fine, sharp sand, made into a thick paint consistency. Allow this coating to dry for at least a day before driving in or fixing the posts. The posts should always be protected for at least six inches above the ground with the preservative in question.

Another well-tested method is to dip the post ends into a mixture of 1 part coal tar (liquid) and 2 parts creosote. Allow to dry off before inserting. As before, coat for at least six inches above ground level.

POULTRY HOUSE

As a sample of a really useful poultry house, scientific in its planning, simple to construct, and certainly not one that should look unsightly

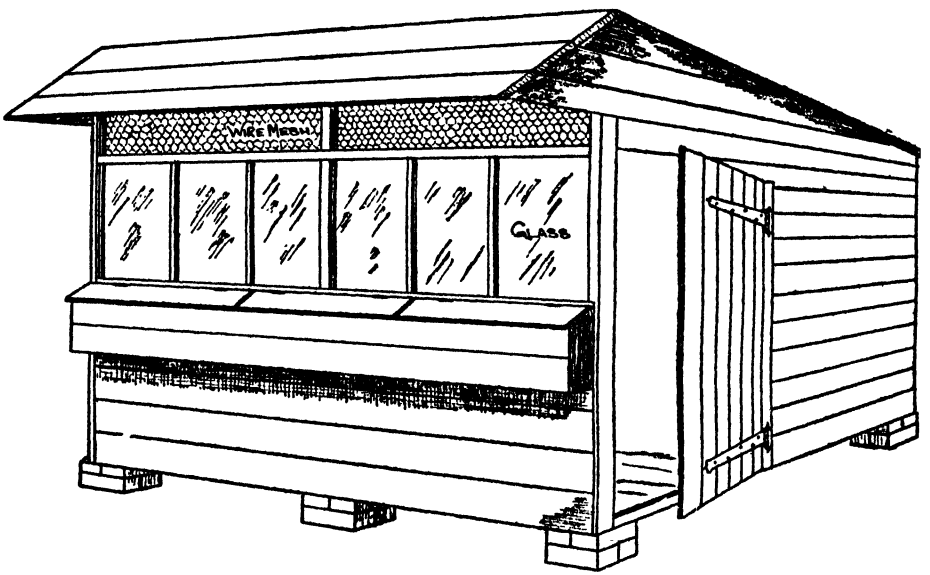


Fig. A.—The Finished Poultry House.

in any kitchen garden or allotment, we submit the accompanying illustrations.

It is a type meant to be erected in a permanent position. For this reason, namely, that portability is not an immediate consideration, its size can be increased at discretion. But the size would be for a house to accommodate fifteen to twenty hens.

The Framework and Weatherboards.—It is suggested that the framework should be of quartering 2 in. by 2 in., but the rafters carrying the roof might be 3 in. by 2 in. quartering. Joists carrying a boarded floor would need to be not less than 3 in. by 2 in., supported here and there on brick piers. Weatherboarding for the sides, back, and front

is suggested. For the roof and projecting eave ¾ in. matchboarding covered with roofing felt and for the door 1 in. tongued flooring V-jointed would be the most suitable arrangement. The nesting-box lid, which is hinged, should be of matching or of solid board battened inside to prevent warping.

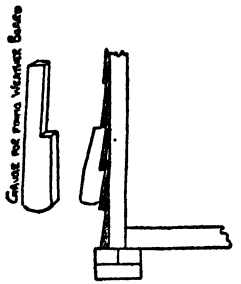
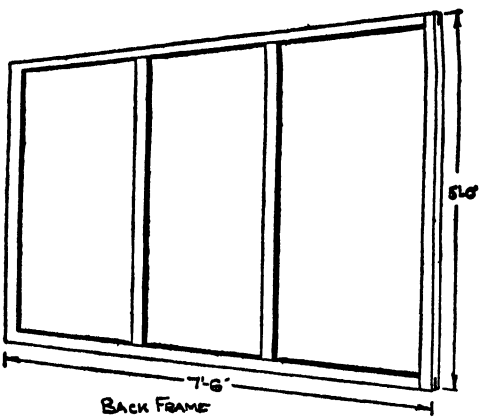


Fig. B.—Gauge for Fixing Weatherboard.

In addition to the timber used there will be required one pair of 10 in. garnet hinges, one dead-lock, three pair of 3 in. iron butts, glass, wire mesh, 6 yards of Ruberoid and a few laths to secure it. A dropping-board and perch can be arranged afterwards and need not be included here.

Construction.—The construction of the frames, back, front, and ends will be the first consideration. They can be mortised and tenoned together or have lap joints, or be nailed together with butt joints. If this latter method is adopted and 4 in. oval nails be used they need not split the wood if holes are bored first, and when the weatherboarding is fixed the job should be perfectly sound. This certainly is the method for quick results. The centre stud should be halved into the two cross-rails and the vertical sash bars should be mortised or notched into the rails and skew-nailed. When the frames



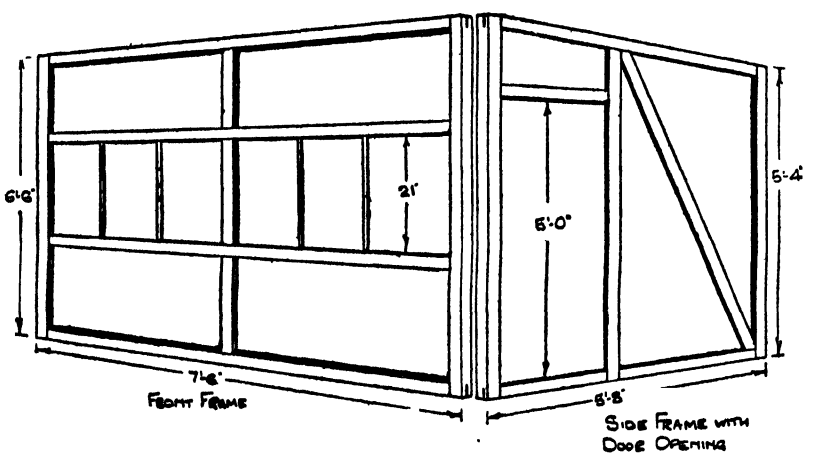


Fig. C.—Constructional Details and Dimensions of the Main Framing.

have been assembled and tested with a rod to see that they are square, let the weatherboard be fastened on to the front and back sections as

required but flush with each end. The end frames are connected with the back and front frames by 3½ in. coach screws, each end being fixed within the back and front frames and flush with their ends. At the four corners covering the ends of the weatherboarding battens 2 in. by 1 in. are nailed flush with the projecting edges of the weatherboarding, and within these battens the boarding at the ends has to be fixed. The boards all round the house should be in perfect alignment and this is accomplished by using a gauge (see diagram) and starting from the bottom board. This gauge is merely a piece of 2 in. by 1 in. batten notched according to the width of the weatherboard used, and cut so that when held with the notch close up under a fixed board the next board rests upon the top of it, and the overlap is always uniform.

Nesting-box.—The nesting-box is nailed or screwed together, having two stout ends and partitions arranged for dividing it up into separate compartments. A narrow strip about 2 in. by 1 in. is fixed on the front inside to keep the litter within the box. The whole of this box can be constructed separately and attached by means of screws afterwards.

The Roof.—In our lists no provision has been made for rafters, and five of these 8 ft. 2 in. long will be needed, for they will have to be cut and lapped to form support for the hood which in front overhangs about 18 in. These should be of 3 in. by 2 in. material and fixed on edge, notched slightly to clip on the front and back frames and screwed from below. By this method it will be possible to detach the roof intact, and by removing the coach screws, the ends, back, and front become separate units easy to handle if the house has to be removed.

The Flooring and Windows.—The floor also can be made in sections of a size easy to lift and should not be attached too securely to the framework of the house.

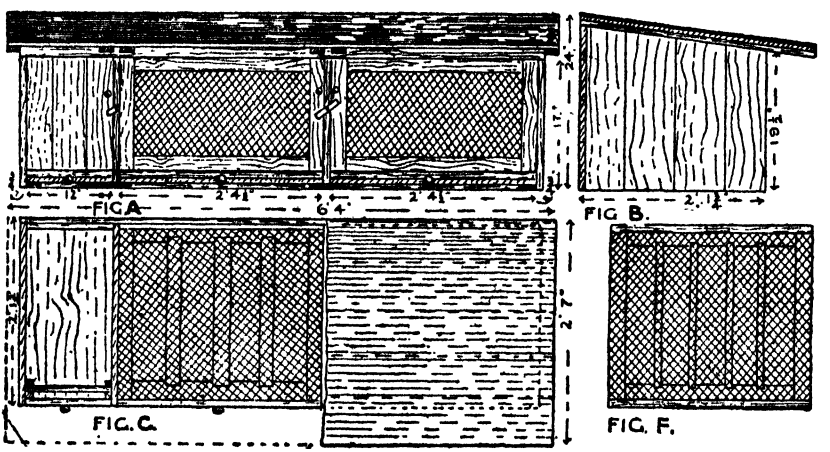
In this style of house the glass windows may be puttied or beaded in permanently, as adequate ventilation is obtained through the wire mesh above. An alternative method would be to have detachable glazed frames. These could be entirely removed during summer months. Limewash inside and an occasional coat of outside Solignum would be a good preservative. To ensure a perfectly dry floor the house should be raised on a couple of courses of bricks arranged in piers.

RABBIT HUTCH, HOW TO BUILD A WELL-DESIGNED CONSTRUCTION, FOR PROFITABLE RABBIT REARING

Now that fur-producing and wool-bearing rabbits are being bred in increasing numbers and provide a remunerative occupation, the provision of really up-to-date hutches of simple construction is a necessity. Although the roughly constructed hutch made from packing-case or box was satisfactory for rabbits bred for food, much more care is required in housing the more valuable and profitable fur-producing and wool-bearing animals, if their coats are to develop in perfection. The hutch

shown in elevations and plan at Figs. A, B and C gives the dimensions of an easily made rabbitry containing all the conveniences that are essential. It gives full protection from the weather and is easily cleaned out.

Construction.—The construction is seen in the sketch of the carcase at Fig. D and the remaining details. Begin by making a bottom framework of ¾ in. wood; two lengths A and B are 5 ft. 10½ in. by 3 in., two ends C are 2 ft. 1 in. by 3 in., and two inner rails D and E are 2 ft. 1 in. by 5 in. These lengths are joined together by means of the lapped halving joint, with the centre of the inner rail D 12⅜ in. from one end, and that of the rail E 2 ft. 5½ in. farther along. To the ends of the frame are nailed some ¾ in. thick tongued and grooved boards, 22 in. high at the back and 19½ in. high in front. These end pieces are joined from end to end at the back with similar matchboarding to a height of 23 in., and in front by a 6 ft.

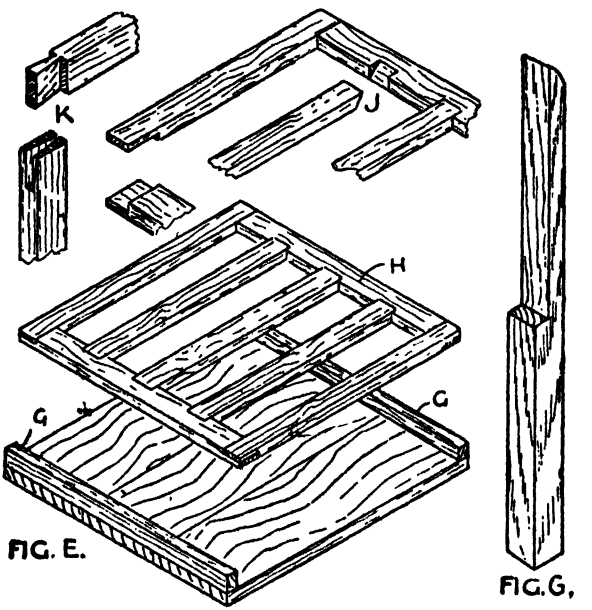


Showing the Appearance and some Dimensions of the Rabbit Hutch.

by 3 in. by ¾ in. strip F, let into the ends flush. The divisions are nailed to the centre of the bottom strips and made of matching ¾ in. thick as in the ends, but a space of about 7 in. or 8 in. is left for the opening into the end compartment, the front strip being about 3 in. wide. The rafters for the roof are 2 ft. 7 in. long, and are cut from 1¾ in. by ¾ in. wood; they are let into the top boards front and back, each side of the partitions, and nailed to the outsides as shown. The roof should be of ¾ in. matching nailed direct to the rafters and then covered with good-quality felt.

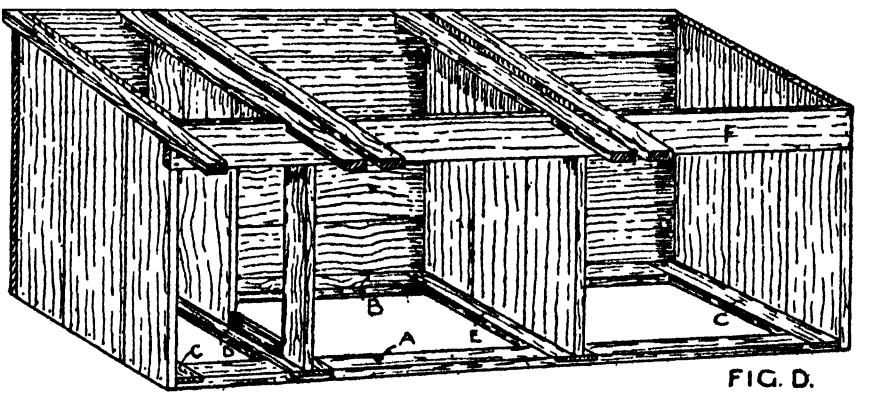
Floors.—The floors are all removable for easy cleaning, and made as shown in the detail drawing at Fig. E. For the inner compartment, nail two 6 in. wide strips of ¾ in. wood, cut to 2 ft. 1 in. long, to two strips 12 in. by 1¼ in. by 1 in. flush with the ends. For the other compartments the bottom boards should be 2 ft. 1 in. long and make up a width of 2 ft. 4½ in., but the exact measurement of the space should be taken to avoid any mistake. The end strips are cut from 1¼ in. by 1 in. wood

and nailed on securely, as at G. The space inside the strips is filled with a frame, as shown at H, the corners are joined with the halving joint and the inner strips are notched in as at J. The wood need not be more than ¾ in. thick and 1¼ in. wide, and serves as a foundation for fine-mesh wire netting, as indicated in the sectional plan at Fig. C and the detail at Fig. F, which shows narrower inner strips. The object of this form of floor is that the hutches are kept quite clean without the use of bedding, and yet it is a simple job to clean them. To complete the floors, fit a screw-in knob in the centre of the front.



Constructional Details of Rabbit Hutch.

Doors.—The doors are framed up with the mortise and tenon joint for preference, but if this joint is a little too difficult, use the simple edge dovetail shown at K in Fig. E. The spaces to be filled should be measured carefully, and the frames made a trifle larger than the measurements; this will allow of careful fitting with a plane. The door to the end compartment is made of matchboarding



Showing Main Body of Rabbit Hutch.

nailed to two battens of 2 in. by ¾ in. wood. All the doors are covered at the back with wire netting and hung with butt hinges and are kept closed by buttons as shown. A sliding board is fitted just inside the end door

to a height of 8 in. or so; the position is indicated in the sectional plan at Fig. C.

The outside of the hutch should be painted at least three coats to protect the wood. Some breeders use limewash for the interior, but it is now usual to coat the wood with one of the many wood preservatives now on the market; this preparation can also be used on the outside instead of paint, but it must be renewed each year to be effective.

The hutch can be supported on a bench or on brackets fastened to a wall, but if it is to stand by itself, four legs should be made from 2 in. by 2 in. stuff as shown at Fig. G, and nailed or screwed to the two ends. If the height above the ground is only about 12 in. or so, the four supports will be quite sufficient by themselves; but with a greater height, cross-rails should be nailed on, a good method being to nail a cross-rail to the inside of the two pairs of legs and then nail on a long strip from end to end across them.

RUSTIC FURNITURE

The rustic chair and table shown in Figs. A and B will form an attractive addition to the garden.

To make these requires no particular technical skill, but just a little

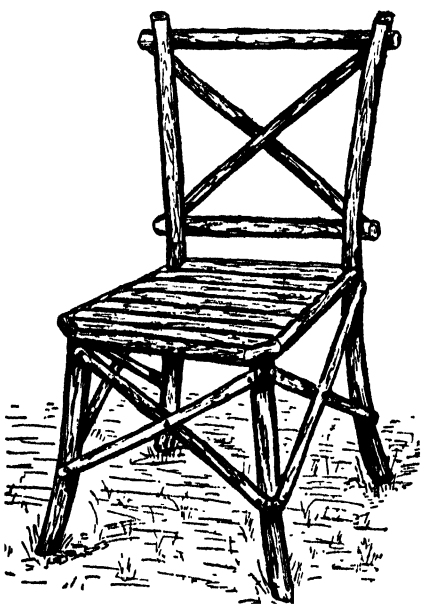


Fig. A.—Rustic Chair.

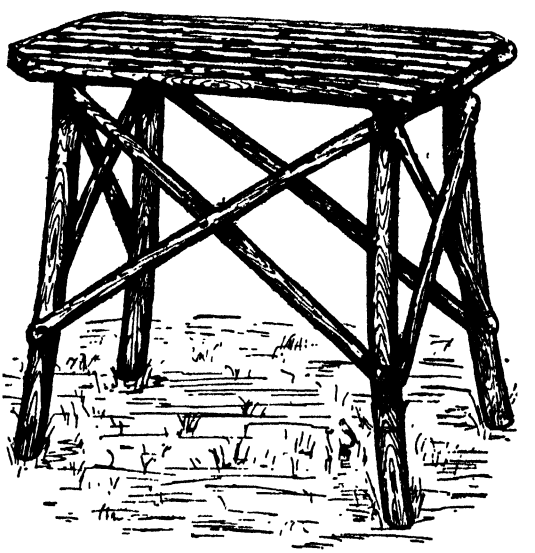


Fig. B.—Rustic Table.

common-sense judgment and ability to use a few ordinary tools, such as the saw, hammer, gimlet, rasp, chisel, rule, etc.

The material is any kind of branches of trees, or fir poles, or peeled oak.

But some rough boards, also, are required, which would do from old packing-boxes.

Making the Chair and Table.—To commence with the chair, the wood seat may be got out first, the shape being shown in Fig. C. The size is 1 in. less each way than the measurements given—that is, allowing ½ in. all round for the hooping of split stuff.

It is composed of two boards, which may be cut square on the ends, to a length of 1 ft. 1 in., to be placed together to make a width of 1 ft. 2 in.; the edges to be cut slant 1 in. from the back corner to the front corner; both front corners being then cut off on a line of 2 in. in length.

The boards will do of ¾ in. thickness, and are kept together by battens about 3 in. wide, by ½ in. thick, fixed across with 1½ in. wire nails clinched on the upper side. The positions of the nails are shown, also several holes which may be bored through, so that when left out in a shower of rain the water could drain away.

For the two back uprights, pieces of 1½ in. diameter stuff are required 3 ft. long and slightly curved. At 1 ft. 5 in. from the heaviest end, a

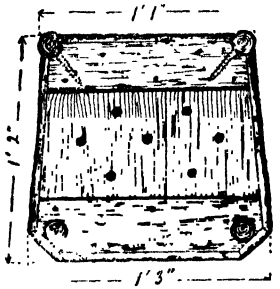


Fig. C.—Under Side of Chair Seat.

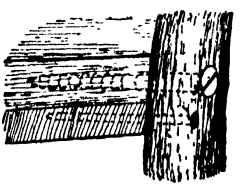


Fig. D.—Fixing the Back Leg to Seat.

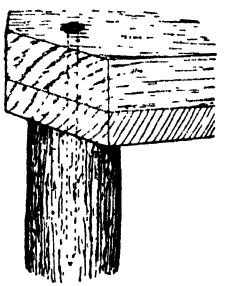


Fig. E.—Fixing the Front Leg.

hole must be bored for a long screw (about 4 in.) right in the hollow, and countersunk for the head to be level.

The back corners of the seat must be slightly cut off and rasped for the uprights to fit, which are fixed with the screw, as seen in Fig. C. (See also Fig. D.)

The front legs are 1 ft. 4 in. long; to be fixed at the positions shown and secured by a 4½ in. wire nail, as in Fig. E.

The chair will then stand up, and must be examined to see that it is of suitable shape; then a horizontal rail of 1 in. diameter stuff can be cut to fix on the back at 1 in. from the top ends. At the points where the rail touches it should be rasped hollow to fit the uprights, and pierced for securing with wire nails. Another rail is fixed in a similar way at 2 in. from the seat. Two cross-pieces are next put on, of ¾ in. stuff, fitted with the rasp and fixed with a nail at the centre as well as at the ends. It is necessary to hold a weight against the stuff when driving the nails.

Three crosses may now be put on the legs, taking notice to keep them properly splayed, and at the back corners of the seat a nail may be inserted as extra strength to the screw, as seen in Fig. D.

The foot ends ought to be cut level to fit the ground and all trimmed slightly round with the rasp.

It is well to coat the wood seat all over with tar, allowing it to soak in, also all open end grain, especially the feet.

Some straight sticks of the rustic must be split with a strong knife or divided by the saw, for covering the seat. They are fixed with fine wire nails, the heads being well hammered down. The piece for hooping the edge is shaped at the ends, with the rasp, to fit the back legs and V-cut to bend at the front corners, as in Figs. F and G. Fig. G shows it fixed with the wire nails.

Fig. F.

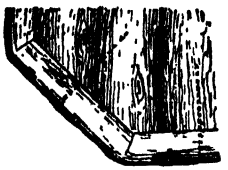


Fig. G.

Fig. F. — Portion of Split Wood for Hooping at Corner of Seat.

Fig. G.—Plan of Corner of Seat.

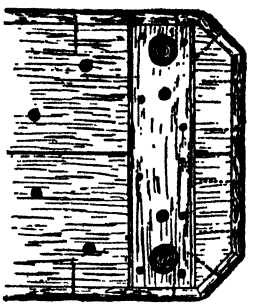


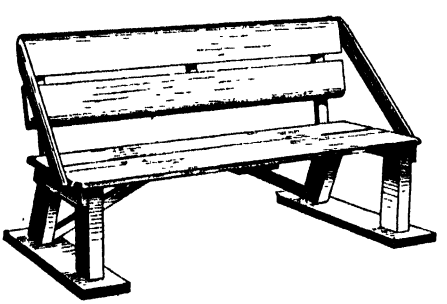
Fig. H.—Part Underview of Table Top.

Making the Table.—This completes the construction of the chair, and having accomplished it to success the table will be found a simpler task. A suitable size is 30 in. by 24 in. for the top, by 30 in. high. Details are shown in Fig. H, but the work is as already described. A good coating of outside varnish will be a great improvement.

SEAT, A SIMPLE WOODEN TYPE

The garden seat described here was constructed at little expense from odds and ends of rough timber.

The legs were cut from a remnant of 4 in. by 2 in. joisting, tied at the top by a length of 3 in. by 2 in. stuff, and at the bottom nailed to a piece of 1 in. board previously creosoted. With all garden seats it is well to provide ample basal surface to prevent sinking into the ground when it is soft after rain. The top tie was given a rake backwards so that the seating surface should throw off the rain.



A Simple Home-made Wooden Garden Seat.

The height of the seat in front was made 16 in. and its width 18 in. Most seats are made too high for comfort. The back stood 19 in. above the seat. The length of seating space was 5 ft.

The boards used for the seat and back were pieces of 7 in. skirting, having one edge worked to quarter-round. To obtain the necessary width a 3 in. strip, cut from the same material, was interposed between the two seat boards, with spaces 1 in. wide between.

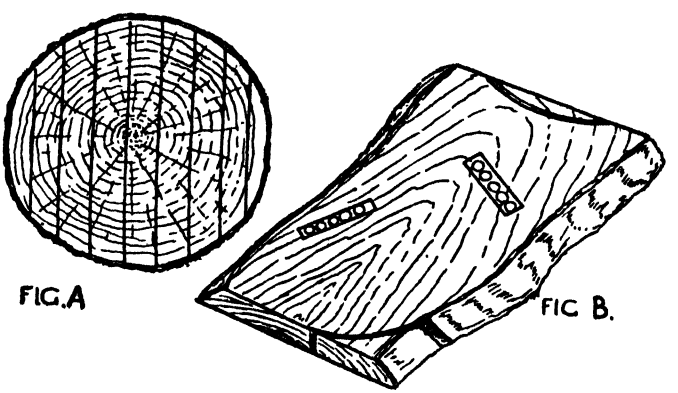
Two struts, seen in the illustration, ensured stiffness to the structure. The back supports were of 1½ in. quartering—rather light for the

purpose, hence the addition of the arm pieces, cut 3 in. wide from the skirting.

Assembling the Parts.—The assembling of this seat occupied no more than an hour after all components had been prepared. Stout wire nails were used throughout. Very little preparation of the timber was needed, as most of it was already machine prepared. The illustration shows the seat after it had received its coat of grey priming colour. Though light in weight—it may easily be carried about by one person—this seat is stiffly built and should last for years. If made from purchased timber the total cost should be relatively low. It should receive two coats of "middle brunswick green," a colour that has the peculiarity of weathering to charming tints of blue and mauve, such as one sees in the pictures of Marcus Stone, who had a fancy for depicting old-world garden seats.

SEATS FROM PLANKS

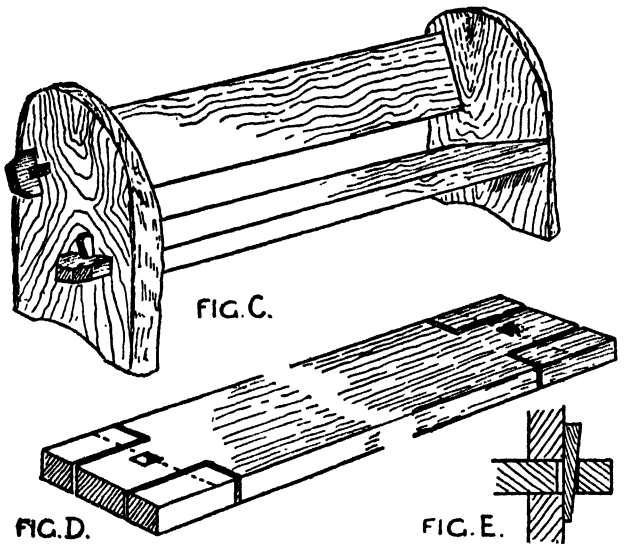
The use of thick planks of wood left from the saw in making garden seats, although not commonly seen in this country, is quite usual in many parts of the Continent. Tree trunks are sawn into sections and then sawn into planks, as shown at Fig. A, varying in thickness from 1½ in. to 2½ in. The edges of the sawn planks, being on the outside of the tree, vary in shape, and are often wider at one end than the other, as indicated at Fig. B. It is possible to obtain elm, oak, and other hard woods of suitable size at most saw mills, especially in country districts, and by the use of a large bow saw seat ends can be shaped, as shown at Fig. B, with little difficulty.



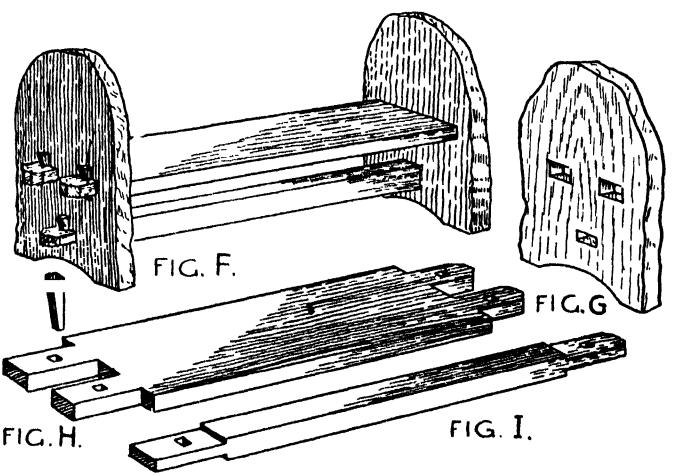
Elm-plank Type of Garden Seat.

A useful form of seat is shown at Fig. C; the ends may be left square at the top, but it is better to round the front top corners as shown. The tenons should project from 4 in. to 6 in., and the wedge should be about 1¼ in. wide at least; a good plan is to allow a third of the width of the tenon as the width of the wedge. Another point to note in fitting the wedges is to cut the mortise for the wedge sufficiently near the shoulder to allow of the shoulders being pulled up tight; this is indicated in the diagram at Fig. D, which shows the marking out of the seat plank, and also in the section at Fig. E, which shows the joint.

In the design at Fig. C, the size of the end pieces should be somewhere about 2 ft. 6 in. to 2 ft. 9 in. long, with a width of from 18 in. to 24 in. The thickness of the planks need not be more than 1½ in. for a single or double seat, but for a long seat it should be about 2 in. or so. The seat plank should be uniform in width and have sawn edges, the width being at least 10 in. Having decided on the size, the mortises should be cut for the seat, allowing at least a third of the width of a 10 in. board for the width of the tenon; but with a wide board it is advisable to have two tenons, each about a quarter of the width with a quarter between. The seat plank is marked out to give a projection of about 4 in. or so outside the end pieces, and this should be in addition to the thickness of the end pieces. The mortise cuts for the wedges should be about one-third of the width of the tenon; first mark on a pencil line the thickness of the end pieces away from the shoulder as indicated in the dotted lines at Fig. D, and then set back at least ⅛ in. inside the line. The back need not be more than 1¼ in. to 1½ in. for a long seat. The tenons are sawn with a hand saw on the waste side of the line, and the mortises can be made by boring a number of large centre-bit holes, as shown at Fig. B, and finished with a wide chisel.



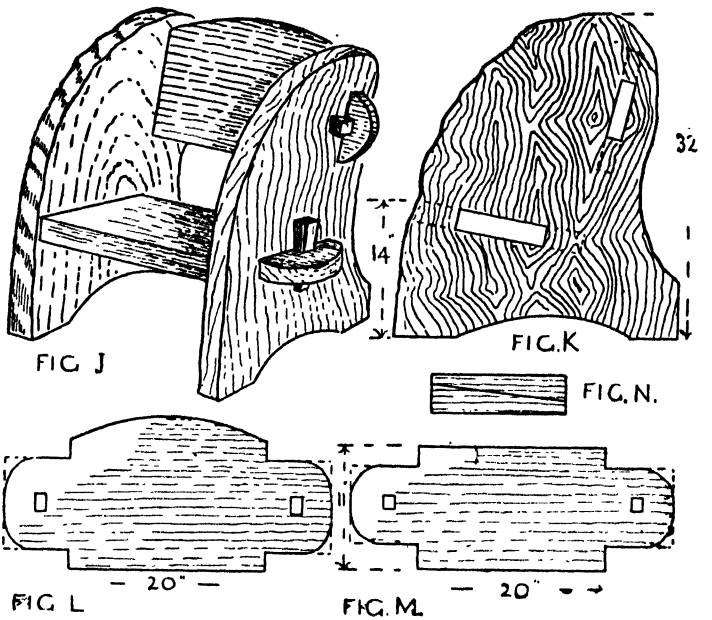
Elm-plank Type of Garden Seat.



Details of Seat without Back.

Long Garden Seat.—Another form of long garden seat is shown at Fig. F; it has no back, but to give the necessary support to the end pieces

it is necessary to fit in a bottom rail under the seat plank. Almost any shape will do for the ends, as shown at Fig. G, provided that there is sufficient room for the mortises; and if the seat plank is wide, two mortise and tenon joints are advisable, as shown in the detail at Fig. H. The ends of the tenons should be trimmed off, either cutting the corners off at an angle of 45° or rounding them. In tenoning-in the under rail, shoulders should be formed as shown at Fig. I. The size of the under rail should be the same as regards length as the seat plank, but the width and thickness do not matter very much; for a long seat, a piece 3 in. by 2 in. or so will be sufficient.



A Single Seat for the Garden.

Single Seat.—A design for a single seat is shown at Fig. J, and here again the ingenuity of the carpenter is needed to select suitable shapes and to alter the outline to conform with general shape, as indicated at Fig. K. The shapes of the pieces for the seat and the back are shown at Figs. L and M, and the method of cutting the wedges in couples is shown at Fig. N.

SHED, CYCLE OR SIDECAR

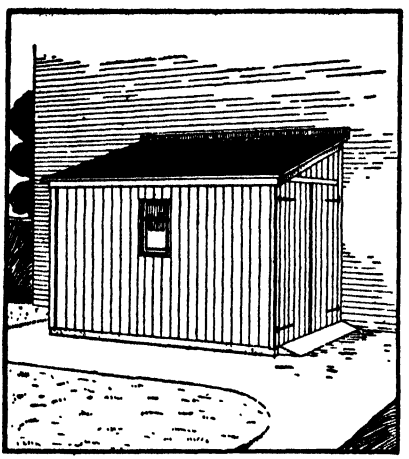
A shed for a motor cycle and sidecar can be easily and cheaply erected by making it of the lean-to type and utilising a wall of an existing building as one of the sides of the shed.

The accompanying drawing shows a shed of the type mentioned, and the following is a description of the method of construction.

The Foundations.—Commencing with the foundations, the ground should be levelled and a concrete floor 4 in. thick laid. To carry this out, boarding 5 in. or so in depth is fixed by means of pins driven into the ground, round the three sides of the floor, and the concrete filled in to a thickness of 4 in. within the area formed by the boards, the latter, of course, being afterwards removed. The materials for the concrete are broken stone or brick, sand, and cement, in the proportions of 4 parts stone, 2 parts sand, and 1 part cement. A box should be used to measure

the materials to the proportions stated, and the latter mixed on a board, the whole of the materials being turned over three or four times in a dry state, then water added, after which the mixture is again turned over, until the whole is incorporated. When filling in the concrete, eight wooden plugs, each 1½ in. square by 3 in. long, are inserted in the former at about 1¼ in. from the edge of the concrete, and to these blocks are spiked the bottom rails of the side and end framing. A detail of this construction is given at Fig. A.

A ramp, constructed of concrete, is formed at the doorway in similar fashion to that already described, and a cement finishing coat, ½ in. thick, composed of 1 part cement to 2 parts sand with water added, is laid on the upper surface and sides of the ramp, the exposed edges of the concrete floor, and the whole surface of the latter.



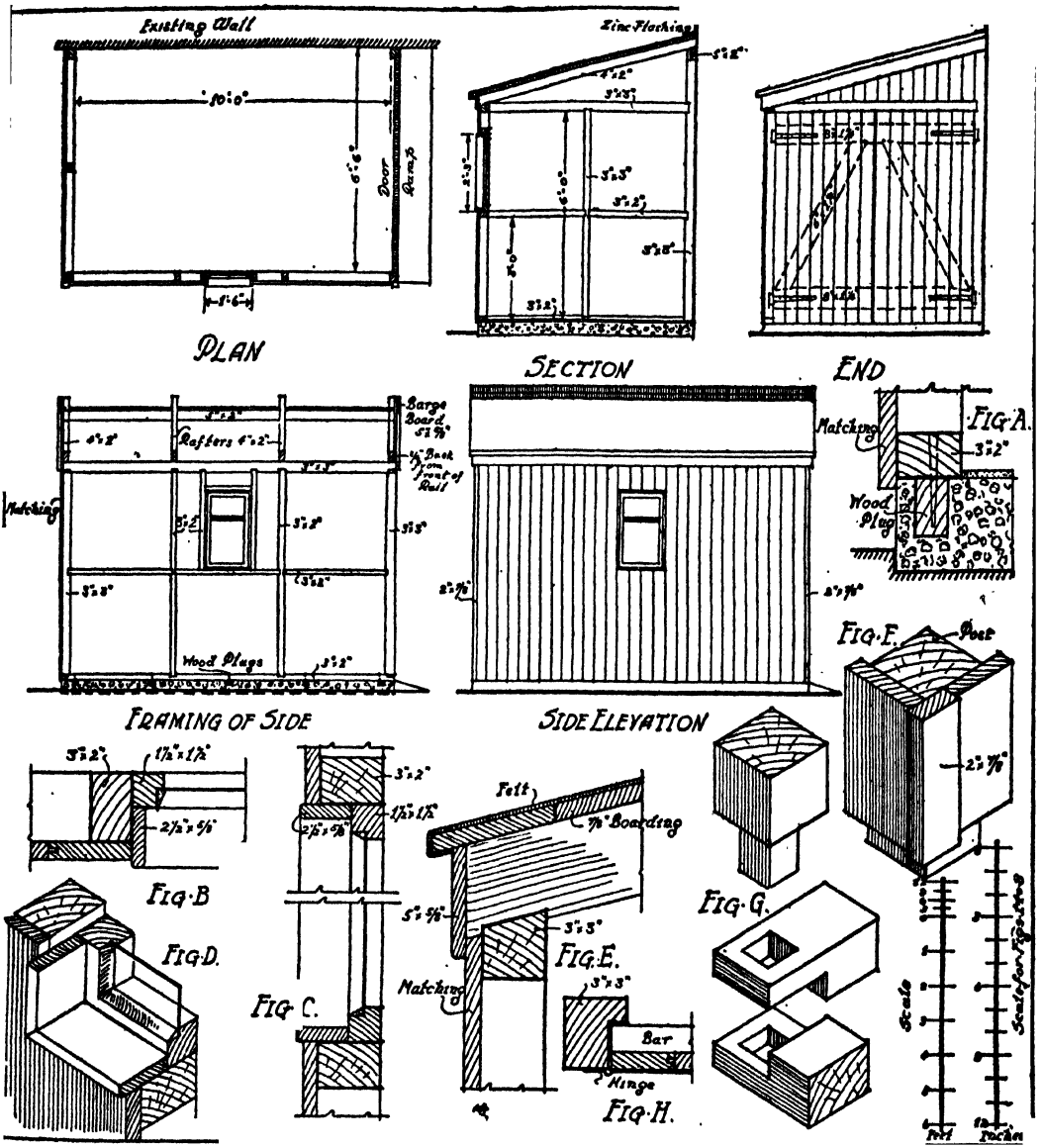
Cycle or Sidecar Shed.

Framework.—The framing consists of 3 in. by 2 in. bottom rails, half checked at the junction of the side and end, opposite the door, and spiked to the plugs inserted in the concrete. The corner posts are 3 in. by 3 in., stub tenoned into the bottom rail, as shown in Fig. G, and also into the top rail. The posts against the wall are also 3 in. by 3 in., fixed to the former by means of Metlex wall plugs. It will be observed that the posts forming the doorway are checked 2 in. deep by ¾ in. wide, to form a rebate for the door (see Fig. H). The intermediate posts, with the exception of the one in the centre of the end, which is 3 in. by 3 in., are 3 in. by 2 in., as are also the intermediate rails and the framing forming the window opening. The top rail is 3 in. by 3 in., bevelled on top, as shown in Fig. E, and notched into the wall posts. All the intermediate uprights and rails are jointed together by means of notching and nailing. The roof is formed of four 4 in. by 2 in. joists, supported at the wall on a 5 in. by 2 in. bearer bevelled on top, and fixed to the wall by means of spikes or the Metlex wall plugs already mentioned. The joists are checked over the top front rail and projected ¾ in. beyond same, as shown in Fig. E. Note that the joist immediately above the door is kept back ¾ in. from the front of the top rail to allow of the matching finishing flush with the front edge of the rail.

The window is formed of a 1½ in. by 1½ in. sash, screwed to the adjoining framing, and with 2½ in. by ⅝ in. beads nailed round the four sides of the opening, as depicted in Figs. B, C, and D.

At each of the front corners is nailed a 2 in. by ⅞ in. strap, so as to form a stop for the matching, and this finish at the corners is illustrated in Fig. F. The ¾ in. thick grooved and tongued matching can

next be fixed, as also the $\frac{7}{8}$ in. roof boarding, which latter projects 3 in. over the ends and about 2 in. over the eaves. The roof is covered with felt, lapped where the sheets join, and nailed every 3 in. apart. The felt



Constructional Details and Dimensions of Cycle or Sidecar Shed.

is carried round and over the edges of the roof boarding where it projects at eaves and ends. At the junction of the roof with the wall a zinc flashing is raggled into a joint of the brick or stonework and batted down over the felt.

A facing plate, 5 in. broad by $\frac{5}{8}$ in. thick, is fixed to the matching round the three sides under the roof, this facing being shown in section in Fig. E.

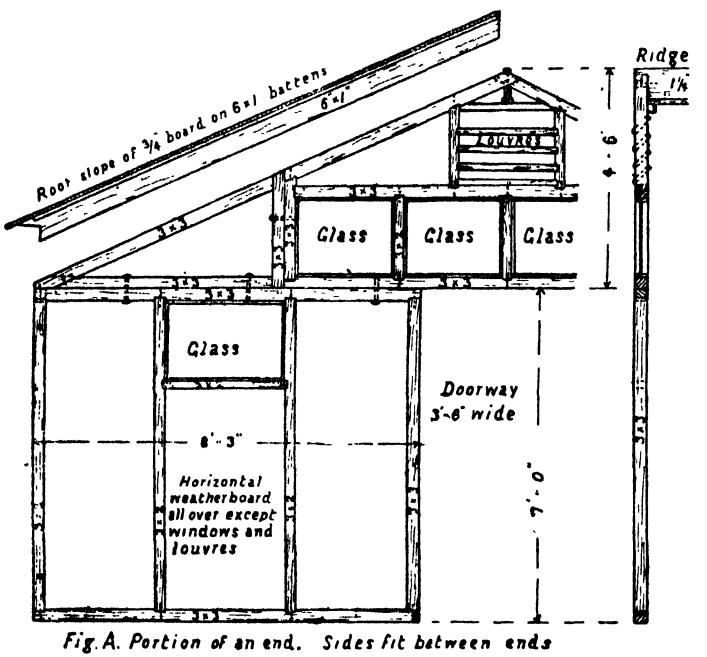
The Door.—The door is framed up in two leaves of $\frac{3}{4}$ in. grooved and tongued matching screwed to 8 in. broad by $1\frac{1}{4}$ in. thick top and bottom bars, and 6 in. broad by $1\frac{1}{4}$ in. braces. The door is hung on iron garnet hinges, and one half is fitted with tower bolts at top and bottom, the lock being a 6 in. rim lock.

White pine could be employed in the construction, but, at a little extra expense, red pine can be got, and a more lasting job obtained.

The exterior woodwork might be treated with Solignum or painted three coats oil paint in a pleasing green shade if desired.

SHED, LARGE PORTABLE

A large portable shed, 20 ft. by 20 ft., may be constructed as follows—details of the work being shown in the accompanying illustrations.



Framework for Large Portable Shed.

The wood at the base should preferably rest on dwarf brick walls or a number of loose bricks on a levelled foundation, otherwise it will be likely to rot prematurely. The main timbers of side and end frames should not be less than 3 in. by 3 in. in cross-section; 2 in. by 3 in. will do for the intermediate studs. There is hardly any need for diagonal bracing. The 20 ft. by 7 ft. sides could be conveniently handled in two parts; the roof slopes, about 21 ft. by 11 ft. 6 in., would be better in three. Each end would consist of a separate part on each side of the central doors connected by one separate central part with glass and louvres above. To avoid making this upper part of so great a length as 20 ft. it would be best to divide into three, as indicated in Fig. A, which makes an end frame of five parts all bolted together before erection of the end. The sides, Fig. B, will also be

bolted up before erection, the two frames of each being united end to end. The corners of sides and ends will then be bolted to form the complete square, 7 ft high to the eaves; $\frac{3}{8}$ in. bolts would be suitable, and long enough to go through the two thicknesses of 3 in. by 3 in. posts and the weatherboarding on the outside of one post. The bolt positions should be carefully marked before erection and $\frac{1}{2}$ in. holes bored for them. In tightening the bolts the framework of the shed should be tested diagonally across corners to see that the distance each way agrees, which will show that each of its corners is at right angles.

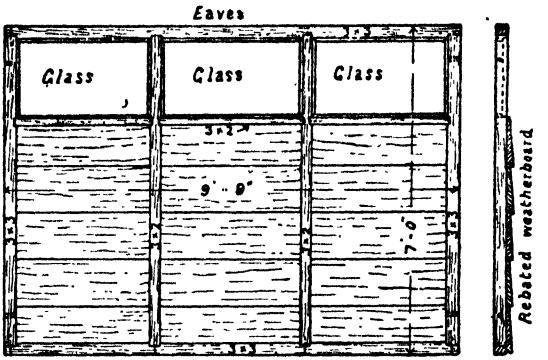


Fig. B. Two of these for each side

Showing the Sides of the Shed.

The Roof.—As the weight of the roof will exert outward pressure against the sides it will be advisable to tie them in the middle portion, or they may bulge out there and allow the slopes to come away from the ridge. Perhaps the best way to do this will be to get two 20 ft. lengths of round iron rod, heat the ends and hammer them flat and bend at right angles, so that these ends will drop over and clip the top edges of the side frames, no fastening being necessary. A ridge piece connects the tops of the end frames, and the roof slopes will fit against this at the top and have battens or rafters notched to fit on the top horizontal rail of the sides at the eaves. With such long slopes the boarding requires deep battens or rafters to stiffen it, as shown in Fig. C. The method recommended is to cut the roof boards all exactly to the same length and square at the ends, lay down each of the three sets and nail pairs of strips across the under surface, being careful to keep the boards in a correct rectangle. Between these strips the thin and deep rafter edges will fit, and a pencil line ruled across the boards on the other side will give a line for driving the nails which hold the boards to the rafters. The side strips will also diminish risk of splitting the rafters in driving the nails. At each end of the shed the outer side strip should be a correct distance in to fit against the inside of the end frame and allow the middle roof slope to fit in closely between the other two. It will be

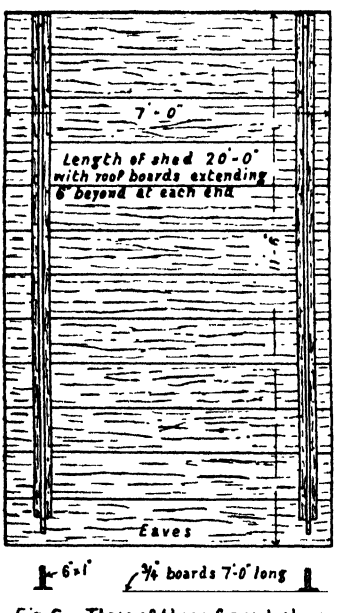


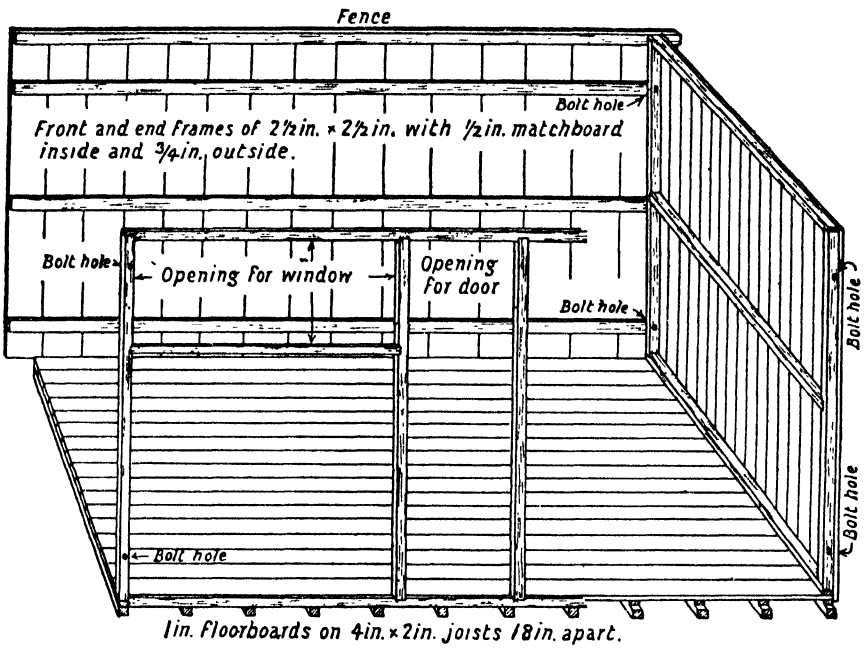
Fig. C. Three of these for each slope

Details of the Roofing.

sufficient to place the slopes in position and they are heavy enough to remain there without fastening. The whole of the roof will be covered with felt or other waterproof material.

SHED, LEAN-TO

A lean-to shed is undoubtedly a handy and economical type to employ where a sound and moderately high fence is available as back. A shed



Making a Lean-to Shed.

of this description is shown in the drawing, the construction being as follows:

The Floor.—A level floor should be prepared by excavating a little of the site soil and filling in with rubble. The surface is well rammed down and can preferably be cemented over.

The floor joists are next laid down, and the boards nailed to them.

The Walls.—On the floor, place the end and front frames, already prepared and boarded on the outside, and bolt them together at the corners. In the accompanying figure an end is shown resting on the floor, and the front frame (incomplete and unboarded to avoid confusion of lines) is seen fitting against the edge of the floor, the joist ends projecting and notched out for it to rest on. The idea of this is to keep the lower rail of the frame flush with the top surface of the floorboards. If there is no objection to letting it stand above them at the entrance, then it would be simpler to let the front frame rest on the boards the same as the end frames. Bolt holes are indicated for two bolts at each corner.

If desired, inside boarding can be put on after the bolts are in. To assist in adjusting the ends and front it will be best to let the outer boarding on them extend about an inch below, so that they will fit against the edges of the floor while the frames themselves rest on it.

The Roof.—The roof can be made with 2 in. by 3 in. rafters about 2 ft. apart on which are nailed the inner boards (for a double roof if desired) of 15 ft. lengths of ½ in. matching.

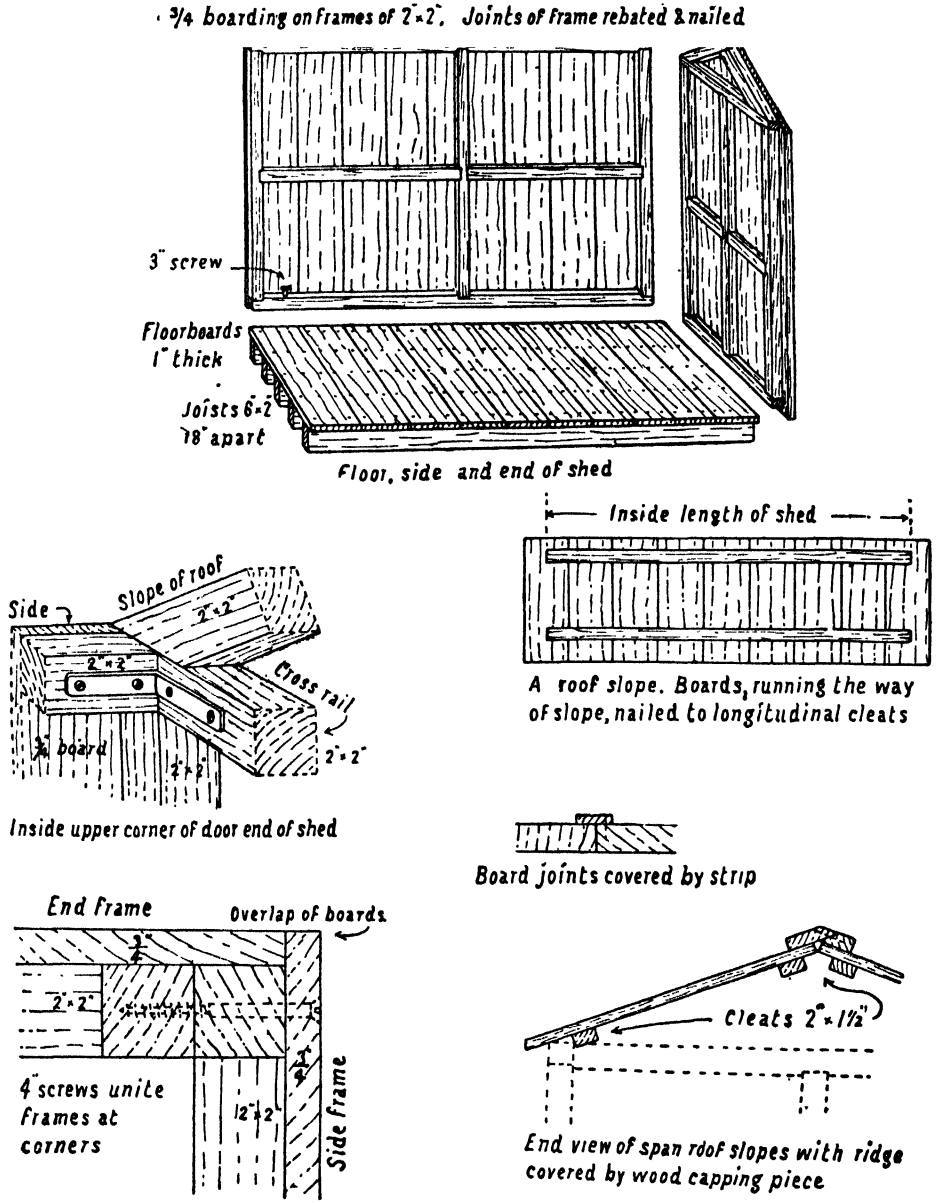
On the upper surface, with a few inches of overlap all round, nail ¾ in. boards, also running the 15 ft. way. The extending edges of these will rest on top of the uprights, and the rafters and ½ in. boarding will be the right size for fitting inside, but strips should be nailed round the inside to help support it. Felt should be put on top, the walls being painted as desired.

SHED, SMALL PORTABLE

The 8 ft. by 6 ft. portable shed described here will be found to be useful for a variety of purposes in the garden.

The accompanying figures show how the parts may be made and what the thickness of timber should be. A floor is made by nailing boards on a series of joists, and the latter should be bedded level on bricks or large transverse baulks of wood on a rubble base. Frames are made for the two 8 ft. long sides with ¾ in. boarding nailed on their outer faces as illustrated. If the lower ends of the boards extend about an inch below the bottom rail they will serve as a stop to keep the frames from being pushed inwards when the bottom rail is bearing on the floor. The height of these two frames should not be less than 6 ft. 6 in. If the roof is to be a lean-to then one frame should be a foot or more higher than the other. In the latter case the roof will be made in a single section, like the floor, except that it will not require deep joists for nailing its boards to. If a span roof is wanted it will be best to make the two slopes to go on separately. The double doors will occupy the entire width of one end, and the other will be a frame either for single or double slope, the latter being illustrated. Its bottom rail will rest on the floor, similar to the sides, and it will be best to fit it between the sides. At this end of the shed the upright posts of side and end frames will be held together by screws, as shown, one near the top and one near the bottom in each pair of uprights. Bolts can be used instead of screws if preferred. At the door end each side may be held to the floor by a 3 in. screw, as indicated, and at the top a horizontal cross-rail and sloping ones for supporting the roof will tie the sides by being screwed on or secured by iron brackets in the angles, as seen. The roof need not be fastened on at all, but will keep in position by its own weight, the cleats on its under surface fitting between the upright parts and keeping the slope from slipping or being pushed out of place. In a span roof a capping piece will be put on the ridge and held by a few screws. The roof boards should extend a few inches beyond the sides and ends of the shed. The floorboards may or may not be tongued and grooved, but the upright boarding and the roof should either be tongued

and grooved or have strips nailed over the joints, as illustrated. Alternatively the roof boards may be covered with corrugated iron or felt. The



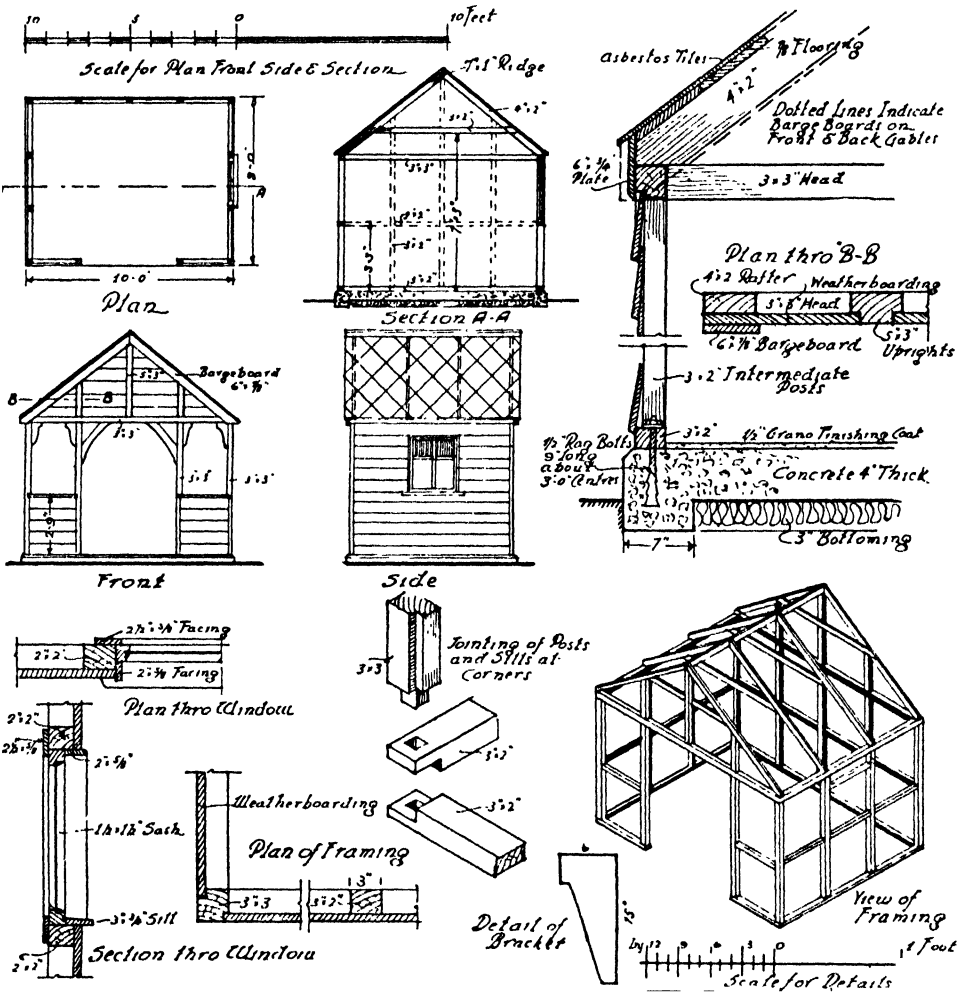
Constructional Details of Small Portable Shed

doors can be made of ¾in. boarding held together by three transverse cleats. They may fit between the sides of the shed and will require strap hinges, as the thickness of the boarding is not enough for butt hinges. A

stop strip for the door can be nailed to the under edge of the cross-bar above the door. The material required can be reckoned by the sizes given in the figures.

SUMMER HOUSE

The accompanying illustration provides working drawings for a summer house.



Constructional Details of Garden Summer House.

The base is of concrete with a granolithic finishing coat and it will be observed that into the concrete are embedded ½ in. rag bolts passing through the bottom runner so that the building is firmly held down.

The Frame.—The framing is all dressed or wrought and consists of 3 in. by 3 in. corner posts, 3 in. by 3 in. posts at entrance and 3 in.

by 3 in. top runner, these members all being checked sufficiently deep to take the required thickness of weatherboarding, which, as the building is not evidently to be lined inside, will require to be dressed on the back. The intermediate posts are 3 in. by 2 in. with the 3 in. face to the front, while the intermediate runners or dwangs are 2 in. by 2 in. The bottom runner is 3 in. by 2 in. slightly bevelled on the outside face to act as a sort of tilting fillet for the weatherboarding at the bottom edge. This bottom runner is half checked at the corners and the posts are stub tenoned into same as illustrated. The window is framed up according to the details provided and the small brackets at the front openings are shaped according to sketch and are 2½ in. thick.

The Roof.—As the roof is to be covered with asbestos tiles, the rafters, which are 4 in. by 2 in., can be spaced about 2 ft. 6 in. apart; these are spiked to the top runner and to a 7 in. by 1 in. ridge plate; 3 in. by 2 in. collars can either be checked into the rafters or spiked to same, whichever method is preferred. Note that in the front and back gables the rafters should be fixed so that the back of the top runner and the back of the rafters are in line, that is to say that the rafters are set back 1 in. from the front edge of the top runner; this allows for the weatherboarding finishing flush with the front of the top runner. The three upright pieces in the front and back gables are 5 in. board by 3 in. thick, this scantling of timber being chosen not for strength, but to allow for a face of 3 in. or so being exposed. The uprights are checked for the weatherboarding as shown in " Plan through B-B " and the gables are completed by means of barge boards which project sufficiently far at the sides to cover the eaves plate.

The roof is covered with ⅞ in. flooring, the dressed side of which is laid towards the inside of the building. A 6 in. by ¾ in. plate bevelled on the lower edge is nailed along the sides at the eaves.

The asbestos slates or tiles can project 2 in. at the eaves, and as the gables may either be laid hard up against the barge boards or project over the top of same, in the former case a small zinc flashing should be fixed by means of copper tacks to the top of the barge boards and carried down the roof towards the eaves over the slates. Of the two methods of finishing the roof at the barge board, the first as described is the usual and best.

SUNDIAL

Although time, in its passage, has left the sundial as a keeper of time behind, there always remains a widespread affection for this ancient instrument as a quaint ornament for the garden, and there seems no reason why its usefulness, although limited, should be altogether ignored.

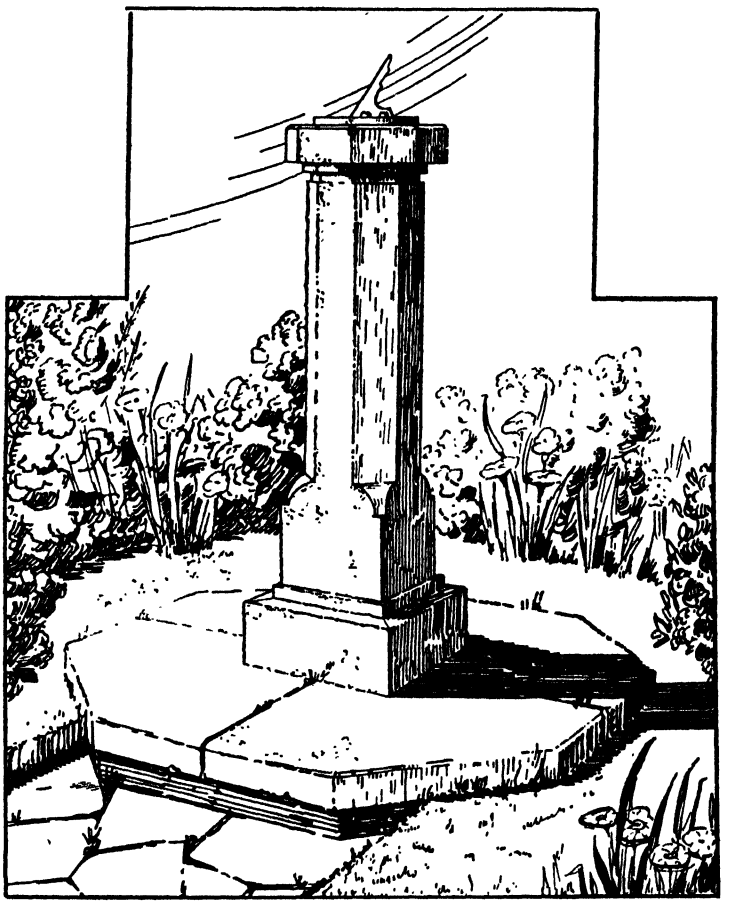
The purpose of this article is to describe how any handyman may, at small expense, add the attractive old-world touch of a sundial to his garden.

Constructing the Pedestal Moulds.—Dealing first with the pedestal, this is made of cement concrete cast in wood moulds; the reader is referred to the illustration on the following page, showing the completed sundial.

It is in three parts, as indicated in Fig. A, namely, the cap, the shaft, and the base, and the height and joint of each are also indicated.

Fig. B is a plan of the cap, and Fig. C a section taken through the shaft, and from these the form of the pedestal may be clearly seen.

The mould for the cap is shown in Figs. D and E, and, as in the cases to follow, all the main dimensions are given in the drawings. It is simply



A Garden Sundial in Concrete.

a square box, made of $\frac{7}{8}$ in. stuff, with angle blocks of suitable dimensions fixed in each corner to form an octagon, which should be set out full size before the actual work is commenced.

To this box is screwed a top of, say, $\frac{3}{4}$ in. stuff, with a circular core, $8\frac{1}{4}$ in. diameter by $\frac{7}{8}$ in., fixed to its under side to form the recess for the dial.

A slight taper to the core is advisable to facilitate the removal of the concrete cap from the mould.

To complete this mould, a $\frac{5}{8}$ in. fillet is mitred and fixed to the bottom edge, and a $\frac{1}{4}$ in. angle fillet is mitred round the top to form a chamfer to the top edge of the cap.

After setting out the section of the shaft full size, a box of $\frac{7}{8}$ in. stuff, 8 in. by 8 in. (inside measurement), and 2 ft. $3\frac{1}{2}$ in. long, should be constructed for same, and the angle blocks fitted, Figs. F and G.

In this member of the pedestal there is a change from octagonal to square, and this is accomplished by a simple concave shaping to the

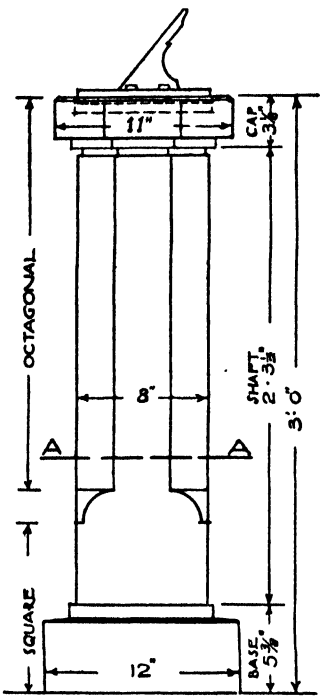


Fig. A.—Elevation of the Finished Sundial.

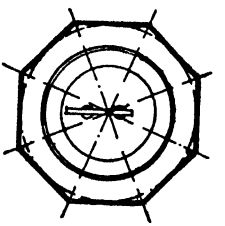


Fig. B.—Plan of Cap and Dial.

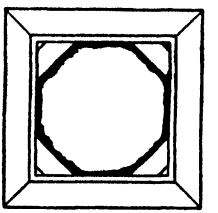


Fig. C.—Section through Shaft at AA.

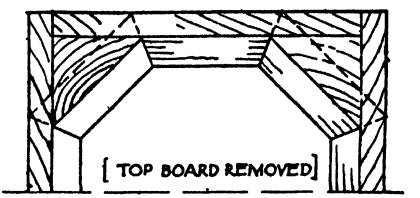


Fig. D.—Half Plan of Mould for Cap.

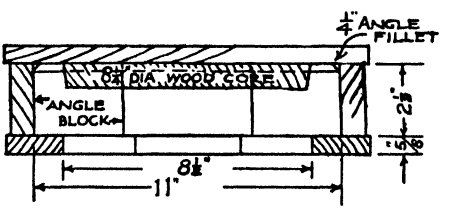


Fig. E.—Section of Mould for Cap.

angle blocks, as shown in the sectional view of the mould, and which leaves a small triangle at the end. (This is shown in Fig. C.) It is worth while to make a cardboard templet for this shaping to ensure uniformity.

At the top of the mould a $\frac{3}{8}$ in. by $\frac{1}{2}$ in. fillet is fixed to the eight sides to form a recessed necking, and the top board is then screwed in place to complete.

The mould for the third part, namely, the base, Fig. H, is comparatively simple, consisting of a box, 12 in. square by $5\frac{3}{8}$ in. deep (inside measurements), and having a top which should be fixed with screws.

The fillet shown is fixed all round the top and it should be noted that it is tapered inwards (say, $\frac{1}{16}$ in.), to form a sloping top to the base.

Before concluding the directions for preparing the moulds, it is pointed out that the interior surfaces should all be planed smooth, and although nails may be used in the work, it is advisable to assemble two opposite corners of each mould, as well as the top boards, with screws to facilitate the removal of the castings.

Making the Concrete.—In preparation for filling with concrete, the insides of the moulds should be thoroughly coated with soft soap, oil, or grease, and all placed upside down on a level floor or paving.

For the concrete, obtain ¼ in. granite chips, clean sharp sand, and Portland cement in the proportion of 2 parts granite chips, 1 part sand, and 1 part cement.

The sand and cement should first be well mixed together on a boarded

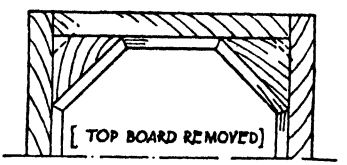


Fig. F.—Half Plan of Mould for Shaft.

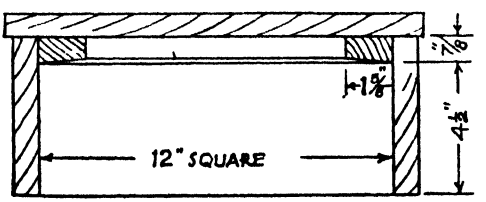


Fig. H.—Section of Mould for Base.

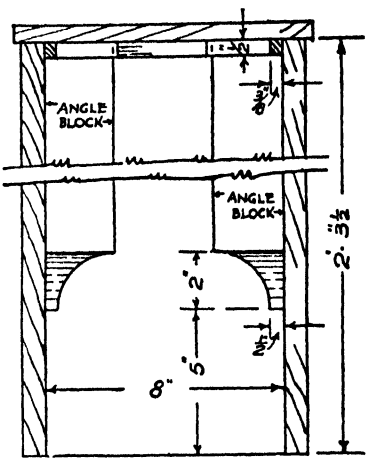


Fig. G.—Section of Mould for Shaft, or Pedestal.

or paved surface and the granite chips added afterwards; the whole then being well turned in the dry state.

Water may then be applied through the rose head of a watering-can; a little at a time, the material being constantly turned until the whole is thoroughly mixed and appears just wet enough to find its way into the corners of the moulds.

Filling the Moulds.—After each shovelful of concrete is deposited in the moulds, they should be rocked a little to assist the mixture into the corners, and a small wood rammer may be used with advantage to press each deposit down; thereby ensuring a compact filling.

The filled moulds should be placed where frost or heat cannot affect them, and the casts ought not to be removed from the moulds for at least two weeks. They should be taken out of the moulds with great care, and allowed a further three weeks for hardening, during which time it is advisable to keep them constantly wetted.

In setting up, the jointing surfaces should be chipped slightly to form a key for the neat cement with which the joining should be done, and, bearing in mind that the sundial has to be set perfectly level, it is important that the pedestal be set level and on a firm, reliable foundation.

A coat of cement wash, applied to the pedestal, will complete it in readiness for the dial.

Constructing the Dial.—We now come to the sundial itself, consisting of two parts, namely, the dial upon which the hour lines are marked, and the gnomon—that upright portion which casts the shadow.

It would be a good plan to take the gnomon, Fig. I, in hand first, and for this a wood pattern must be made for a casting in gun metal. The sloping edge, termed the style, must make with the dial face an angle equal to the number of degrees of latitude of the place in which the instrument is to be set up (for London this is 51½ degrees), and, being of great importance, care must be taken in making the pattern and in filing up the casting to ensure accuracy in this respect.

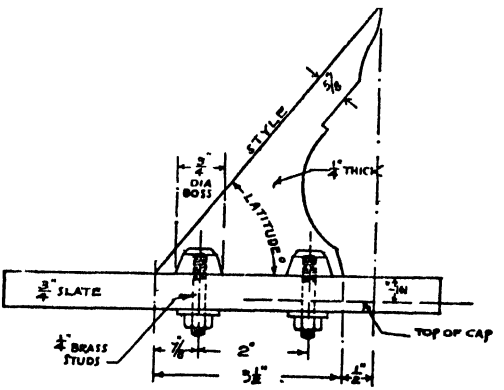


Fig. I.—Details of the Gnomon.

The gnomon must also stand quite perpendicular to the dial.

For the dial, a general arrangement of which is given in Fig. K, procure a piece of ¾ in. hard blue slate. Rub one face level and smooth, and turn the same to 8 in. diameter, also cutting in the concentric rings forming the margin. The outer line is a bare ⅛ in. in width.

Then through the centre of the disk lightly scratch a north and south (or twelve o'clock) line, and across this, at the point indicated in the drawing, lightly scratch the 6 o'clock line, which must be at exact right angles to the first.

The finished thickness of the gnomon's style must now be accounted for by putting on two more light lines parallel to the 12 o'clock line, as shown in Fig. K, where the gnomon is seen in position.

Then, by drilling the two holes in the slate for the studs, the gnomon may be fitted to its correct position—that is, central on the 12 o'clock line and with the lower end of the style touching the 6 o'clock line.

Setting Out the Hour Lines.—The setting out of the hour lines on cartridge paper may now be proceeded with (Fig. J), and it is advisable to do this to a rather large scale, drawing the arc to a radius of, say, 10 or 12 in., and using a hard pencil with a sharp point.

First draw the line BC and, about half-way along it, and perpendicular to it, draw AJ.

The first will be the 6 o'clock line, and the second the 12 o'clock line.

With centre A, describe the arc, and divide this into twelve equal parts, D, E, F, G, H, K, L, M, N, O, and draw lines joining DO, EN, FM, GL, and HK.

Put in the line AP (shown dotted in the diagram), to make an angle with the 12 o'clock line equal to the latitude of the dial's situation. Then perpendicular to AP, which represents the style of the gnomon, let fall the lines, *q*, *r*, *t*, *u*, *w*, to the points Q, R, T, U, W.

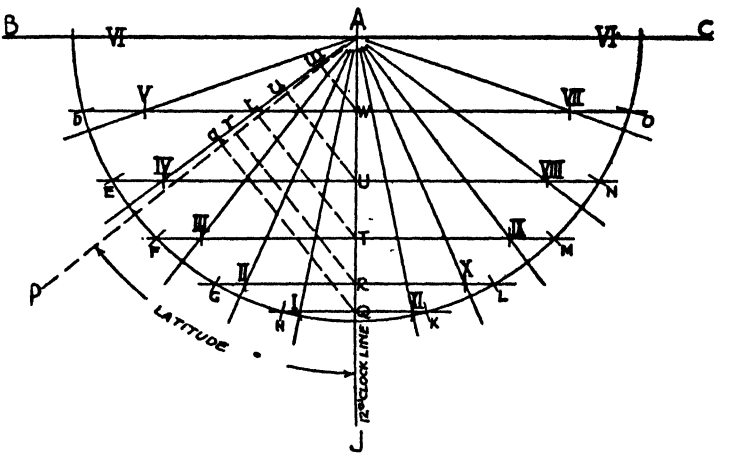


Fig. J.—Showing Method of Setting Out the Horizontal Dial.

With dividers carefully take distance q, Q, and with one point on W, lay it off on each side of the 12 o'clock line to V and VII.

Similarly take distance *r*, R, and, with one point on U, lay it off on each side of the 12 o'clock line to IV and VIII, and then distance *t*, T, with point on T, to III and IX, then distance *u*, U, with point on R, to II and X, and then distance *w*, W, with point on Q, to I and XI.

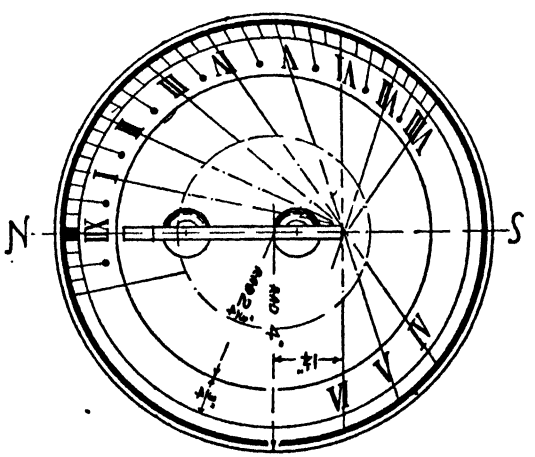


Fig. K.—The Finished Horizontal Dial.

From centre A draw lines through the points last found, and these will be the hour lines from VI a.m. to VI p.m.

The half- and quarter-hour lines may be obtained by dividing the arc into forty-eight equal parts at the commencement, and proceeding on the same principle as explained for the hours.

When the setting out is completed, put the compass point once more on A, describe a circle of 3½ in. radius, and cut out the disk, then cut the cartridge paper along the 6 o'clock line, and sever down the 12 o'clock line into two half dials. Then, with the gnomon removed, fit the cartridge paper up to the 6 o'clock and 12 o'clock lines already scratched on the slate and, with a scratching tool, mark off from the edge of the paper where the lines come.

It should be borne in mind that it is not the central north and south line on the slate, but the parallel lines representing the thickness of the style which the paper must be located on.

It will now be realised that the dial really has two centres, and the gnomon two styles—one on each side of the central line.

It now remains to cut in the hour lines and numerals. The broad members of the latter are best formed by first making two parallel cuts with the edge of a bradawl, and afterwards removing the intervening material with the bradawl used flat.

The hour lines IV and V a.m. are continuations of lines IV and V p.m., drawn through the eastern centre. Similarly the hour lines VII and VIII p.m. are obtained by producing lines VII and VIII a.m. through the western centre.

Hour lines VI a.m. to XII are drawn from the western centre, and XII to VI p.m. from the eastern centre.

The broken lines in Fig. J are simply put in to make these points clear, and should not appear on the finished dial.

White oil colour, rubbed into the markings on the slate, will make them distinct. The colour may be used liberally, and the superfluous paint removed by scraping over the dial face with a wood straight-edge.

Setting the Dial.—As regards setting the dial, the slate must be quite level, the upper end of the gnomon pointing north, and the 12 o'clock line must lie due north and south (by which is meant the geographical north and south), and the simplest way is to set the dial by the sun at 12 o'clock noon, using a reliable watch, set to Greenwich mean time, and making the necessary allowance according to the equation of time.

Ordinary linseed oil (glazier's) putty, worked to a soft condition, may be used for setting the dial in the pedestal. The slate can be bedded and levelled on this material with its 12 o'clock line approximately right. Then, when the time comes for final adjustment to the sun the dial may be given a slight turn to right or left, as required.

It should then be left for a day or two for the bed to harden, when the space round the edge may be filled in, and, if ever it becomes necessary, the dial can be easily removed without risk of damage.

The equation of time, which gives the difference between sundial time and Greenwich mean time for each day of the year, is to be found in *Whitaker's Almanack.*

SWING

The following describes an extra-high swing for juvenile (and adult) use in the garden.

Materials Required.—The essentials are two 22 to 24 ft. pine posts, having diameters of 6 in. at the base and 4½ in. at the top. Another 4 in. pole, about 4 ft. 6 in. to 5 ft. long, is required for the cross-piece. This is fastened to the vertical posts by cutting Vees in their tops, and fastening a sheet-metal strap (16 gauge will do nicely) over the cross-piece.

A $\frac{3}{8}$ in. coach bolt through the strap sides and the vertical post gives a good fixing, but it is advisable to drill a $\frac{1}{4}$ in. hole in the top of the strap and drive a 6 in. nail right through into the top of the vertical post, to prevent the cross-member moving endwise. To protect the cross-member and the hooks a pair of inclined boards, forming a kind of roof, is used. At the bases of the vertical posts a heavy plank, measuring 2 in. by 12 in., is spiked, by means of four 6 in. nails, to each.

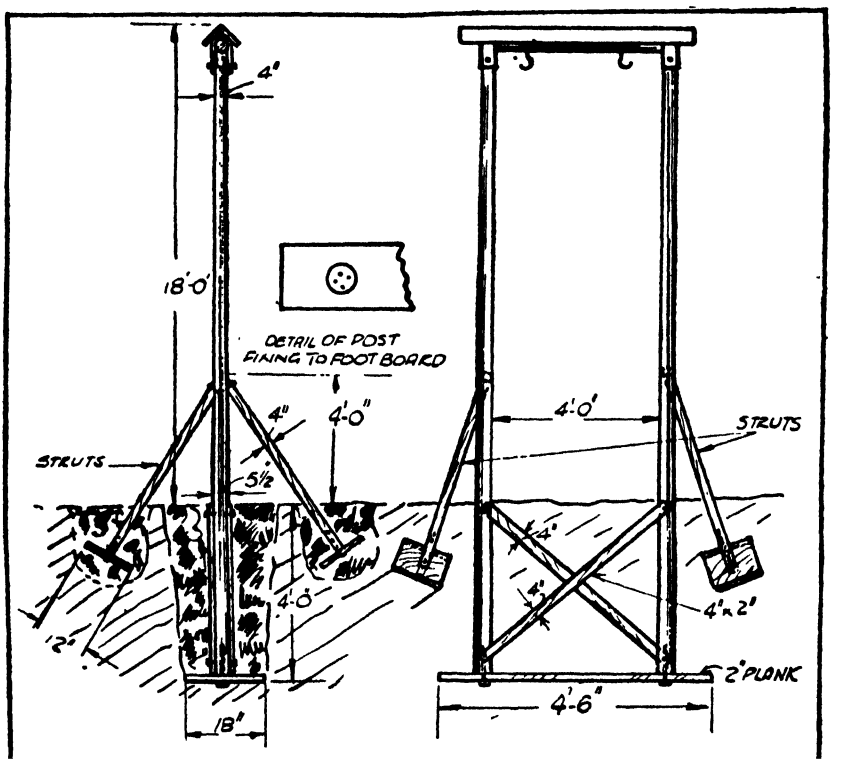


Fig. A.—Illustrating Method of Constructing and Fixing a Strong Garden Swing.

Erecting the Swing.—Before commencing to erect the completed swing all the exposed surfaces are liberally coated with Solignum, the latter being allowed to dry in for a day or two.

The diagram Fig. B shows how the swing may be erected with but little assistance.

The post hole is dug as shown, excavated earth forming a fulcrum B, on which the pole A rests, its extreme tip being supported by post D.

On hauling on rope E the mast is pulled up to an angle of about 60°, the stay wire C preventing the foot from fouling the post-hole side.

Having got the swing frame into this position, it is an easy matter to get it vertical, using a plumb line for the purpose. The hole is then

filled up with bricks, concrete fragments, stones, and earth; the last being well rammed down.

Finally each pole is braced with two 4 in. strut posts let into the ground, as shown in Fig. A. The ends of these struts have strong boards nailed

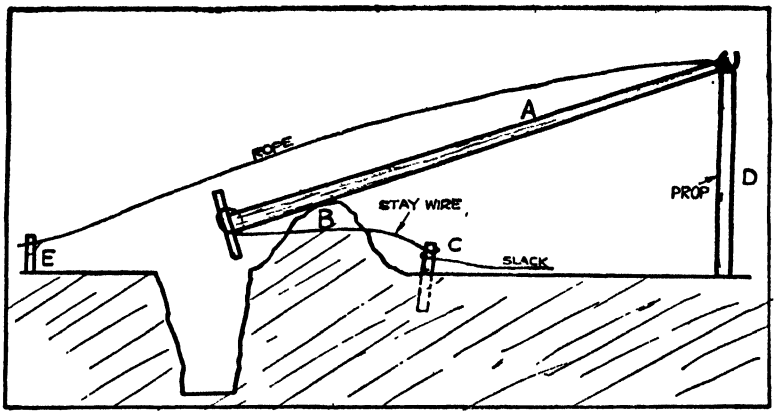


Fig. B.—Showing how the Posts are Erected.

on, to act as earth " anchors." It should be mentioned that these pole struts are splayed outwards in respect to the swinging plane, so as to give more clearance for the swing and lateral rigidity to the frame posts.

SWING, PORTABLE

The portable swing described and illustrated here will be much appreciated by the younger generation for use in the garden.

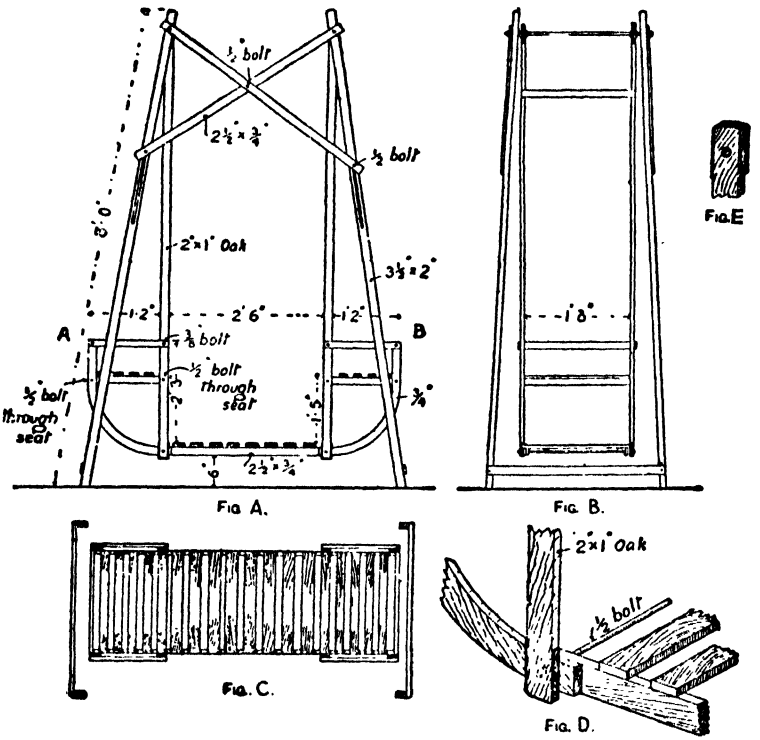
Figs. A to C (which are not to scale) give the general construction. The greater the length or height of these stays, the greater the sweep of the swing which is suspended from them. The stays should not be less than 8 ft., so as to give a good spread at the bottom. If this be curtailed, it does not stand firmly, and is inclined to tip when swinging high. The slots in the main stays will allow the cross-stays to be regulated and adjusted to the position required.

The hangers of straight-grained oak, which support the swing, are suspended on $\frac{3}{4}$ in. cross-bolts screwed at each end for nuts, with washers on the inside, so that the hangers swing clear of the main supports, and where suspended on the cross-bolts they must have bushed holes or thimbles to prevent the wood from rubbing through. These thimbles can be cut out of a piece of $\frac{7}{8}$ in. gas piping, and to strengthen the wood top above the thimbles narrow strips of thin steel should be nailed over same (see Fig. E).

The strips must also be fixed at the bottom of the hangers (see Fig. D), and thimbles should go through all pieces of wood where friction takes place. The hangers are carried straight down to the platform, and to this platform and hanger the seats are also connected; but each part at this

point is entirely separated, which allows the platform to remain in a horizontal position while in motion.

The ½ in. bolt to secure these separate parts passes through from side to side (Fig. D). Battens or wood strips are used for the platform and seat, so that when the swing is left out in the rain the water will



Constructional Details of Portable Swing.

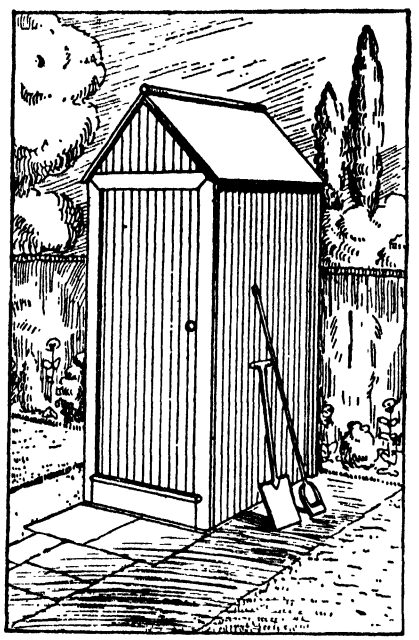
not lodge on same. Other particulars as to sizes, etc., are given on the illustrations. As all the chief sections are bolted together, it may easily be taken apart and stored during the winter.

TOOL HUT

A small hut or shed is a useful adjunct to the garden allotment, as in it can be kept the various tools and implements necessary for working the allotment. The structure need not be elaborate or expensive, and the following description with accompanying drawings will provide the amateur with instructions that will enable him to build a hut which, although simple in appearance, is strong and convenient.

The small-scale plan, sections, and elevations illustrate the general construction and appearance of the hut, whilst the large-scale details furnish further information as to the more intricate parts of the structure.

The Framework.—With regard to the construction, the four corner posts are each 3 in. by 3 in. and 9 ft. 3 in. long, let 2 ft. into the ground, which is well rammed after the posts are in position. The three bottom rails are also 3 in. square checked and nailed into the posts 1½ in. or so above ground level. Before, however, fixing the bottom rails at the sides, it is necessary to drive, about 2 ft. into the ground, short 3 in. by 3 in. posts so that their heads are level with the under side of the bottom rails and in a position midway between the corner posts. These short posts form a support in the centre for the bottom rails which have to take the weight of the floor and joists. The intermediate posts, rails, and framing for the small window are all 3 in. by 2 in. —as shown on the plan and sections— checked and nailed at the joints. The top rails, of which there are four, are 3 in. by 3 in., half-checked to each other at the angles and fixed to the corner posts by means of stub tenons, or simply spiked to the former. An isometric view of the framework is given at Fig. C.



A Garden Tool Hut.

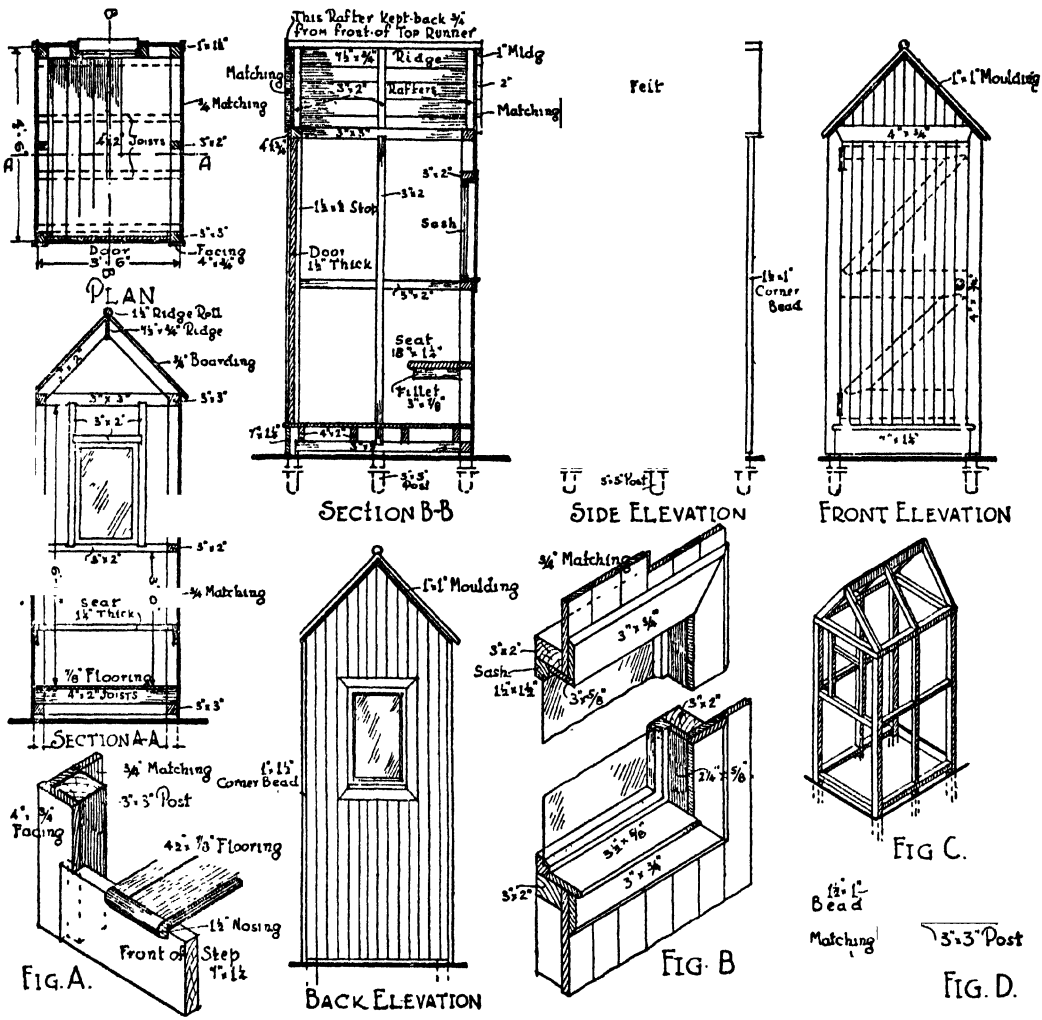
Making the Roof.—Dealing with the roof, it will be observed that this is framed up of 3 in. by 2 in. rafters, spiked to the top rails and to a 7½ in. by ¾ in. ridge piece. Note that the rafter above the doorway is kept back from the front of the top rail—which also serves as the door lintel—¾ in., this being done to make a neater finish between the matching on the gable and the facing round the doorway. The rafters are covered with ¾ in. boarding, which projects about 2½ in. at the eaves and 2 in. from the face of the matching, or 2¾ in. from the outer face of the rafters at the gables. A 1½ in. diameter ridge roll is then nailed to the apex of the roof and the roof boarding covered with roofing felt, lapped where the sheets join and nailed every 3 in. apart. The felt is carried round and over the edges of the roof boarding where it projects at the eaves and gables.

The Matching.—At the back corners it will be noticed there is provided a 1½ in. by 1 in. corner bead, as illustrated in Fig. D, running the whole height of the building, until it butts against the sloping roof. This bead is for the purpose of making a suitable stop for the matching, and it is also for this reason that the 4 in. by ¾ in. door facings are projected 1 in. beyond the outer face of the front posts at the sides. (See Fig. A).

The whole of the framing, with the exception of the door and window

openings, is covered with $\frac{3}{4}$ in. grooved and tongued matching, special care being taken to cut and fit same neatly at the window opening.

The matching nailed to the sides of the rafters above the doorway finishes flush with the front of the top rail, and the horizontal part of the 4 in. by $\frac{3}{4}$ in.



Dimensions and Constructional Details of Tool Hut.

door facing is carried across the top of the doorway and nailed to the top rail.

A 1 in. by 1 in. moulding is fixed to the face of the matching at the gables under the projection of the roof boarding.

Flooring.—Four 4 in. by 2 in. joists, spiked to the two 3 in. by 3 in. side bottom rails, are necessary to carry the floorboards, which are $4\frac{1}{2}$ in. broad by $\frac{7}{8}$ in. thick, grooved and tongued. For the formation of the step

at the doorway a piece 7 in. deep by 1¼ in. thick is required. This piece is checked at the ends so that it will be ¾ in. thick where it is nailed to the doorposts, the facings being cut to allow it to fit in so as to finish flush with the former. The flooring is also nailed to this step front, finishing against a bottle moulding which is secured to the edge of the flooring and to the step front. The method of construction is clearly shown at Fig. A.

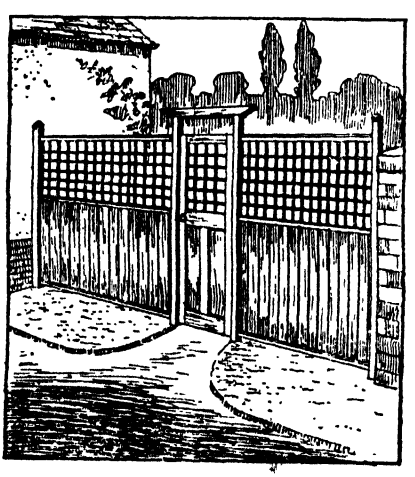
Window, Door and Fittings.—The window sash is 1½ in. square, glazed with sheet glass, and securely nailed to the framing. For a neat finish to the outside 2¼ in. by ⅝ in. beads are nailed round the top and sides of the window with a 3½ in. by ⅝ in. plate on the sill. A facing 3 in. broad by ¾ in. thick, mitred at the corners, is nailed to the matching round the window, the details of which are fully illustrated in Fig. B.

The door is of the framed and lined variety, and can be made if desired, but doors, both new and second-hand, can be picked up so cheaply that it is scarcely worth the time and trouble involved to make one. The door is presumed to be 1½ in. thick, and to keep the same in position when closed, 1½ in. broad by ½ in. thick stops are used, fixed to the under side and inner faces of the lintel and doorposts respectively.

A seat, some shelving, and a few hooks add additional comfort and convenience to the owner, and ought to be provided. The whole of the woodwork is of red pine, and should be finished both outside and inside with two coats of Solignum. A hut of this description, if properly treated and looked after, will last for years.

TRELLIS WORK, HOW TO CONSTRUCT AND ERECT

Although the rustic trellis fence is often adopted for garden work, the more formal type built to a pattern in dressed timber is also very popular and very effective when erected.



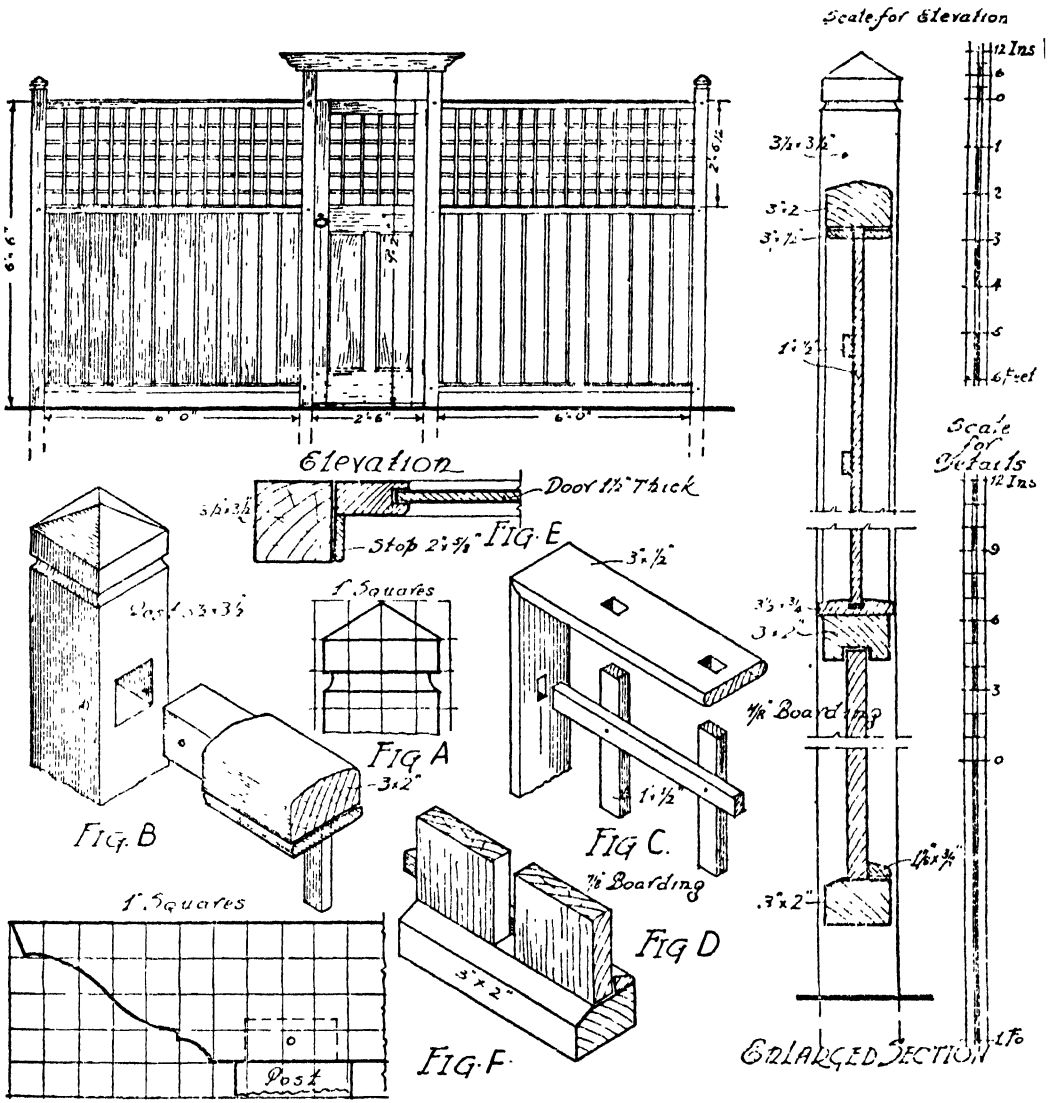
The Finished Trellis Work.

Square Mesh Pattern.—Various designs are possible, but in the accompanying drawing it will be observed that the square mesh pattern of trellis has been used, this design being just as pleasing to the eye as any of the other forms.

The Posts and Rails.—With regard to construction, the end posts are each 3½ in. square and about 9 ft. long, 2 ft. of which is let into the ground. The posts have moulded heads according to the design shown in Fig. A, and are mortised to take the ends of the rails. The posts at the gate are also 3½ in. square and 9 ft. 3½ in. long, let into the ground and mortised for the rails as before. A stub tenon is formed at the head of each of these posts for the lintel piece, which is 4 in. deep and 3½ in. thick with a length of 4 ft. 2 in. This lintel has

moulded ends as illustrated in Fig. F, and is mortised for the stub tenon of the posts and pinned in position.

The rails are 3 in. broad and 2 in. thick, weathered and checked for



Constructional Details of Trellis Work.

the boarding, as shown in the enlarged section. The rails are tenoned and pinned into the posts as depicted in Fig. B, and it will be found advantageous to keep the bottom rail 3 in. from the ground to avoid the possibility of it being affected by the damp.

Fence Boarding and Trellis Bars.—The lower portion of the fence is filled in with 4 in. by $\frac{7}{8}$ in. boarding nailed and checked into the rails, while for fixing to the bottom rail a $1\frac{1}{8}$ in. by $\frac{3}{4}$ in. fillet is nailed to the top of the rail, to which the boarding can be nailed (see Fig. D).

The boards are not placed close together, but have a 1 in. space between them, although of course there is nothing to hinder the former being nailed close, but, if this method is desired, it would be better to be done with grooved and tongued boards.

To fix the trellis bars, first prepare a frame with top and sides 3 in. by $\frac{1}{2}$ in., rounded on edges and mitred at the corners. The bottom member is $3\frac{1}{2}$ in. by $\frac{3}{4}$ in. weathered on top, and when in position forms a cope to the middle rail. The frame should be so made as to fit exactly between the posts, and afterwards taken out, when the mortises for the bars should be cut and the bars fitted. The frame can then be screwed into position, and by forming the trellis in this manner it will be found that the work can be executed in a much easier and more expeditious way. The trellis bars are 1 in. broad by $\frac{1}{2}$ in. thick, and the method of forming the work is illustrated in Fig. C.

The dimensions of the squares are 4 in. by 4 in., but the size is a matter of taste and can be altered to suit individual requirements.

The Doorway.—If a door is desired it can be made $1\frac{1}{2}$ in. thick, the lower part having panels $\frac{3}{8}$ in. thick, while the upper portion is filled in with trellis work to correspond with the top division of the fence.

Door stops should be nailed to the posts and would look better carried right up to the under side of the lintel. An enlarged plan of the door is given at Fig. E.

Red pine is a suitable timber to use for a fence of this description, and it should be given two coats of paint, either white or green, or it might be finished in Solignum.

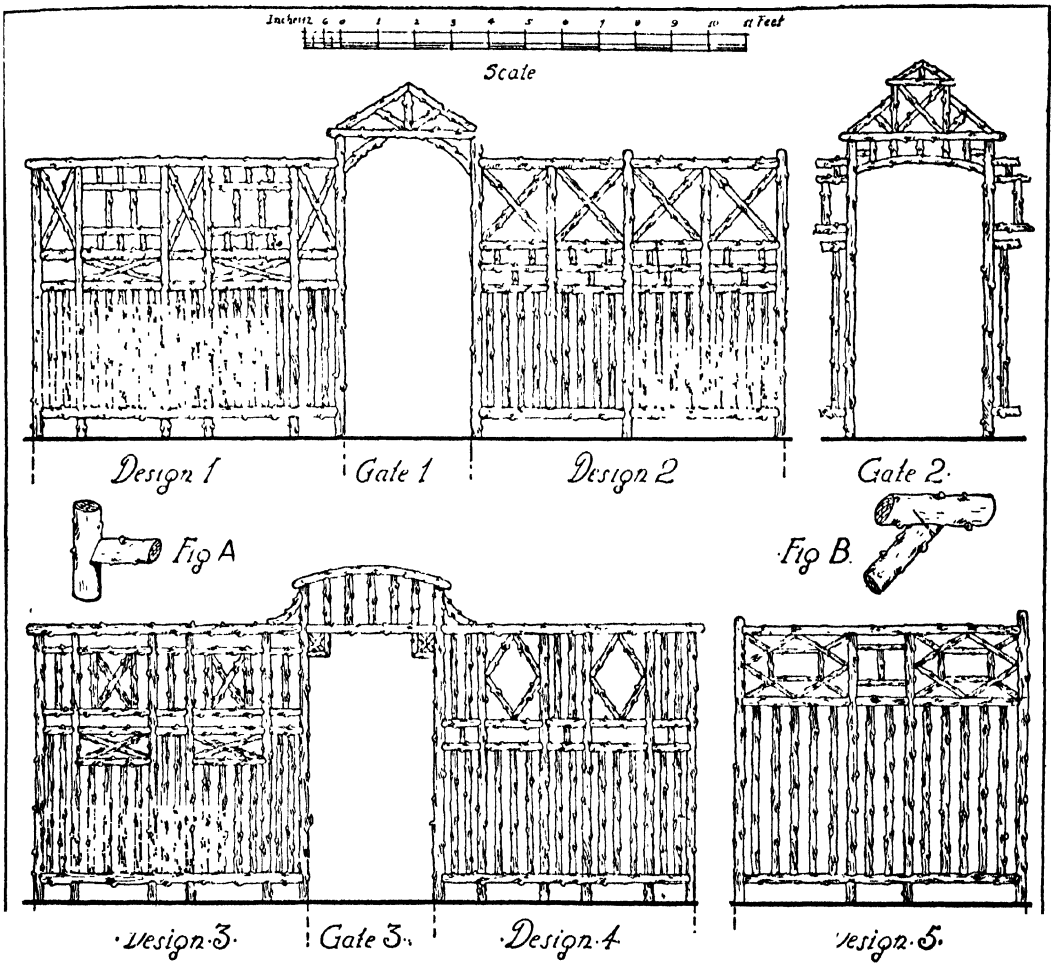
Rustic Trellis Work.—The greatest difficulty to the amateur contemplating the erection of rustic trellis is the provision of a suitable design, and it is with the object of furnishing this that the accompanying designs have been prepared.

With regard to the construction and erection, a few brief particulars are given for the assistance of those contemplating the carrying out of any of the designs.

The Materials Required.—The material used is larch, the main uprights being 3 in. to 4 in. diameter, whilst the intermediate members are 2 in. to $2\frac{1}{2}$ in. diameter. It is important that the trellis be sufficiently strong to resist the strongest gales, and for this reason the main uprights should be let into the ground, say, about two feet, and the earth well rammed round about them. The principal horizontal members such as the top, bottom, and middle rails should preferably be notched to the main uprights, after the manner of Fig. A, the lighter members being simply bevelled and spiked to the adjoining parts, as at Fig. B.

Some Useful Designs.—Dealing with the designs illustrated below five types of trellis are shown, along with three gateways or entrances.

Designs 1 and 2 show alternative elevations, which, besides being of good appearance, are somewhat out of the common. Either Gate No. 1

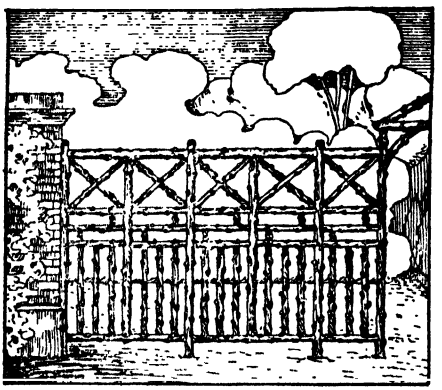


Various Types of Rustic Trellis Work.

or Gate No. 2 could be adopted with either of these fencing designs, and look equally effective.

Designs 3, 4 and 5 are more simple and less ornate in character, but nevertheless would look extremely effective when erected in position.

Gateway No. 3 is also simpler in character than the two examples already illustrated and could be incorporated with any of the designs for the trellis fencing illustrated.



Another Rustic Trellis Design.

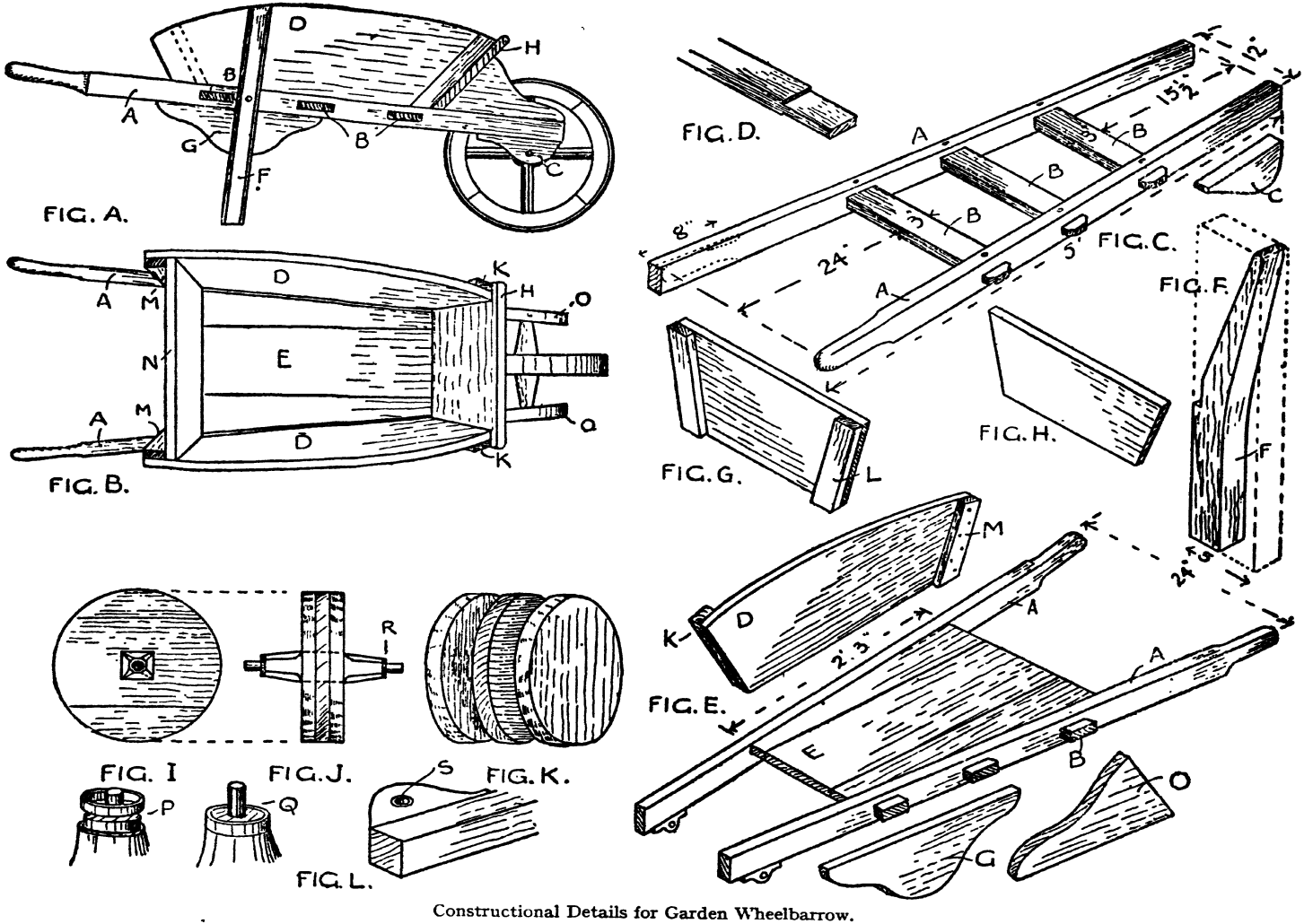
Protecting the Posts.—It is, of course, advisable to protect the ends of the poles exposed and also the portions that go into the ground. It is a good thing to apply liberally creosote or Solignum to the sawn ends of each member used; and even where the butt joint occurs water is apt to find its way into the cells of the wood, and eventually to cause rot. Posts that are let into the ground may either be liberally treated with creosote, Solignum, or tar, or may be charred in the manner of fencing in order to obviate the effects of rot. Similarly, it is better to use galvanised nails than ordinary bright iron ones, if one wishes to obtain a practically permanent structure.

WHEELBARROW, TO MAKE A

The making of a garden wheelbarrow as shown at Figs. A and B is quite within the capabilities of the woodworker who can use the saw, plane, and chisel reasonably well, but it is very important to obtain good material. It is also possible to make a satisfactory wheel, although wheelbarrow wheels can be purchased at a reasonable price. The framework of the barrow should be of oak or ash, the bottom, sides, and ends may be of deal, but to make a really strong job the best wood to use is elm or oak.

Construction.—To begin the construction, first prepare the length for the bottom frame as shown at Fig. C. This is composed of two 5 ft. lengths of 2½ in. by 1½ in. ash or oak, as at A, the correct name for these lengths being strines. The cross-pieces at B, known as sloats, are tenoned into the strines and are cut from 3 in. by 1 in. material. The best way to mark out the framework is to place the two long lengths on the floor between two parallel lines, the outside measurements at one end being 24 in., with a measurement of 12 in. at the other. To prevent the movement of the lengths, a brad should be driven through each end into the floor, and then the position of the sloats may be set out; one is 24 in. from the wide end and the one nearest the small end is 15½ in. away, the middle one being spaced between the two. When the correct position of each of these pieces has been fixed, a pencil line should be drawn on the top edge of the strines from each side of the three cross-pieces, a line being also drawn on the under side of the cross-pieces as well.

Marking Out.—The lines are now marked on all sides of the several pieces, using the try-square, pencilling the lines on the strines, and cutting in the lines on the cross-pieces. The ends of the cross-pieces are now gauged first ⅛ in. and then ⅞ in. from the top or face side; the



Constructional Details for Garden Wheelbarrow.

waste of the tenons is now sawn down to leave the ends as at Fig. D. The bracket to carry the wheel axle as shown at C should be cut from the same wood as the frame and be about 9 in. long and at least 3½ in. thick. The pieces of wood should be glued as well as screwed strongly to the strine. If a wheel is purchased, it is usual to have a pair of metal brackets; these have to be bolted to the strines. Care should be taken to glue up the joints of the frame and to peg them as well. Hard-wood pegs should be used; they are tapered slightly and about 4 in. long. The projecting ends are trimmed off when the frame is finished. The shaping on the handle end of the strines can be done with a spokeshave, but some of the waste can be removed with a saw or a draw-knife, leaving just the actual shaping to be done with the spokeshave.

Preparing the Sides.—The next job is to prepare the two sides as at D (Fig. E). These are of oak or elm, but any hard wood can be used, and should be used in preference to deal. The total length of each piece at the bottom should be 2 ft. 4 in., and cut from a board as near as possible to 11 in.; if a wider board can be obtained, so much the better. The ends are cut to an angle of about 40°, but it will be near enough if the length of the board before shaping is about 3 ft. 2 in. It will be seen that one end is just a little less than the full width, not more than 1 in. less, with the other end shaped down to a height of about 6 in.; but these measurements need not be kept to exactly, although they give the usual proportions. The bottom edges of the boards are now planed down on one corner to give a splay of 3½ in. or so; this again is not important to an inch, but both sides should have the same slope.

The frame is now filled in across the sloats with ¾ in. boarding as at E, the boards having a total length of 2 ft. 3 in. or so; the top of the sloats are so recessed to allow of the bottom boards being flush with the top edges of the strines; the ends of the boards should be slightly rounded. It is an advantage to tongue and groove the bottom boards, but if the centre board is a wide one there should be no difficulty in nearly filling the space, especially as elm boards can be obtained very wide. The side lengths are now placed in position and two laths nailed across the top to keep them in position. The next job is to make the two legs as shown at F (Fig. F). These are cut from two 2 ft. 2 in. lengths of 5 in. by 2 in. hard wood; the bottom is marked off 2 in. square and carried up 13 in., then notched in ½ in. for a height of 2½ in. The slope from the top of the notch should be equal to the slope of the sides, but as the width of the wood allows of a 3½ in. slope it must be increased if the splay is more. The waste is now sawn off about ⅛ in. away from the line, and the finish can be done with a spokeshave or draw-knife, although some of the finishing can be done with a smoothing plane.

Fixing the Legs.—The two legs when finished are secured to the strines with bolts, using thin washers on both sides to prevent the wood drawing in. The side boards are now screwed to the upper portion of the legs. To give additional strength to the legs, prepare two brackets

as at G. These should be of hard wood, 1 in. thick, 6 in. wide, and 18 in. long, the shaping being done with bow saw and spokeshave. The brackets are screwed to the inner sides of the legs and skew-screwed to the under side of the strines.

The front board as at H may be attached in two ways, either by screwing it to fillets of 2 in. by 1 in. wood screwed to the side pieces as at K, or by screwing the fillets to the front piece as at L (Fig. G). The board should be over 11 in. wide if possible: a width of 12 in. or 13 in. would not be too wide. The length should allow of sufficient room for the necessary projection beyond the sides. The bottom edge is planed down to fit on the bottom and the correct slope of the ends marked out from the sides. Two fillets are now screwed on the inside at the back or handle end as shown at M. These should also be of 2 in. by 1 in. hard wood. The back piece as at N (Figs. B and H) is now fitted neatly, with bottom edge and sides planed to the required slope, and then screwed in position. The brackets in the front as at O are now cut to shape and fitted in, the material being at least 1 in. thick. These pieces will complete the barrow itself, which should now be given two or three coats of paint.

Making the Wheel.—The method of making a wooden wheel is shown at Figs. I and J, and consists of screwing three circles of 18 in. diameter together with the centre layer at right angles to the outside pieces as at Fig. K, using wood from ¾ in. to 1 in. thick. If wood 18 in. wide can be obtained it will save gluing up strips to make up the width, but in case it is necessary to use more than one width, the middle piece should be as wide as possible. The pieces should be glued as well as screwed, and quite a good number of screws should be used. The axle is made from a 2 in. to 3 in. square section length of hard wood, mortised in full size and the projecting portions tapered off to a diameter of 1¼ in. The ends should be of ½ in. diameter iron rod let into the wood for a distance of at least 4 in., and project 2 in. or so. It will be necessary to complete the wooden portion of the axle by fitting on ferrules. These can be cut from iron or brass tube and fitted on tightly, as shown at P and Q (Fig. L). Another method is to use round iron plates as at R, but the ferrule is preferable. The diameter of the wheel can be protected by lengths of hoop iron nailed on at intervals, but it is often possible to obtain a rim from an old barrow. The rim is fitted on, providing that the wood is a tight fit, by heating it to a red heat, pushing the wood in, and then cooling it off with water before the wood has time to become more than slightly charred. If wooden brackets are fitted to carry the axle, the hole should be bushed with a suitable piece of brass tubing, as shown at S (Fig. K).

WOODEN BARRELS, TO RENDER WATERTIGHT

If wooden containers are allowed to get too dry, they are often leaky and may become useless. When this stage is reached the mistake is

often made of condemning the barrel as firewood, whereas the leaks or cracks can easily be stopped up by a mixture of washed cheese or casein, powdered slaked lime and plaster, made into a paste with white of egg. The edges of the crack should be rubbed over with white of egg before applying the cement. This cement, which becomes stone hard, can be used for repairing broken earthenware.

WORKSHOP

The workshop illustrated in Figs. A and B is framed up from $2\frac{1}{4}$ in. by $1\frac{1}{4}$ in. prepared material, and covered with tongued and grooved matchboarding.

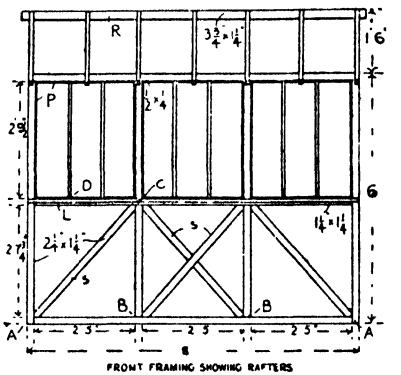


Fig. A.

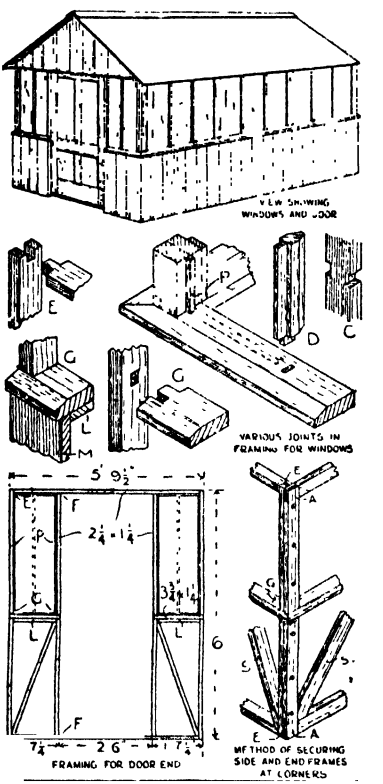


Fig. B.

Details of Home Workshop.

It should be erected on a concrete floor raised just above the ground level. The front and one end are glazed, the front is entirely covered in, while the back is provided with a large flap, which can be opened out to enable the workshop to be used in comfort during the summer. All the joints are of the simplest kind, the whole of the construction being well within the capabilities of the amateur who can use the ordinary tools of the carpenter. Full dimensions are given of the framework for the sides and

ends; the former are made with the thickness of the material from front to back, while the ends are made with the width of the material as the thickness; this enables end frames to be bolted or screwed to the front frames, as shown.

Constructing the Frames.—The method of construction is as follows: Front frame: cut off two uprights each 6 ft., top and bottom rails 8 ft., join at corners with half-lapped joint, as at A. Fit two inner rails, equally spaced apart with halving joint, but preferably with dovetail, as at B. The centre rail of $3\frac{3}{4}$ in. by $1\frac{1}{4}$ in. material, 8 ft. 2 in. long, is notched into the uprights; those on the inner upright are shown at C, the projection in front being $1\frac{1}{4}$ in., the end on door frame being mitred. The diagonal struts S (Fig. A) are fitted in after frame is screwed together at the corners. The sash bar, as at D, is notched into the top and middle rails, and suitable fillets bradded on sides of uprights and top and bottom on the rails to complete rabbet for the glass, as shown at P.

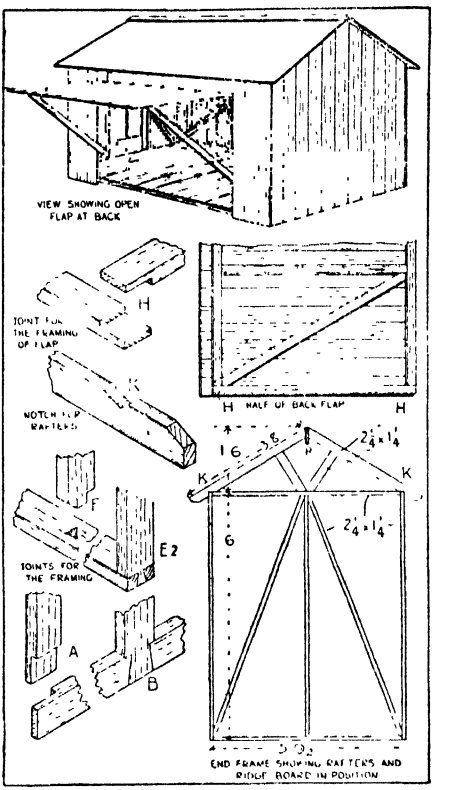


Fig. C.—Some Further Details of Home Workshop.

Back frame is formed of four uprights of 6 ft., and three rails of 8 ft., outer spaces are fitted with diagonal struts, as shown.

Door end frame is framed up with four 6 ft. uprights and top and bottom rails, 5 ft. $9\frac{1}{2}$ in.; corners are jointed, as at E, but preferably as at E2. Inner uprights are tenoned in, as at F. Centre rails are notched and tenoned into uprights as at G, the end on front frame being mitred.

Fillets are bradded on in side window openings, as at P. The plain end is framed up with three uprights of 6 ft. and two rails of 5 ft. $9\frac{1}{2}$ in.; two diagonal struts are fitted in the two halves, as shown. Sides and ends are now bolted or screwed together.

The framing for back opening is framed up with lapped joints, as at H; the rafters are cut to 3 ft. 8 in., and nailed to an 8 ft. 8 in. by $3\frac{3}{4}$ in. by $1\frac{1}{4}$ in. ridge R, and notched to rest on top rails, to which they are nailed, as at K; two struts are fitted to end rafters as shown.

Matchboarding.—Matchboarding $\frac{3}{4}$ in. thick is nailed on sides, fillets, as at L, being nailed to under side of centre rails for nailing boarding against, as at M. Roof is covered with 8 ft. 8 in. lengths of matchboarding with felting on top; capping is formed with one 4 in. and one 5 in. width

of 1 in. by 8 ft. 8 in. material. A door, 5 ft. 9½ in. by 2 ft. 6 in., is hung on framing; this can be purchased ready framed up, or can be made similarly to flap. Flap should be hung with large back-flap hinges and kept in position when open with struts; these can be secured to side of frame with thumb-screws or notched to rest on stout screws. All outside woodwork should be painted three coats or thoroughly coated with a wood preservative.

SECTION 2

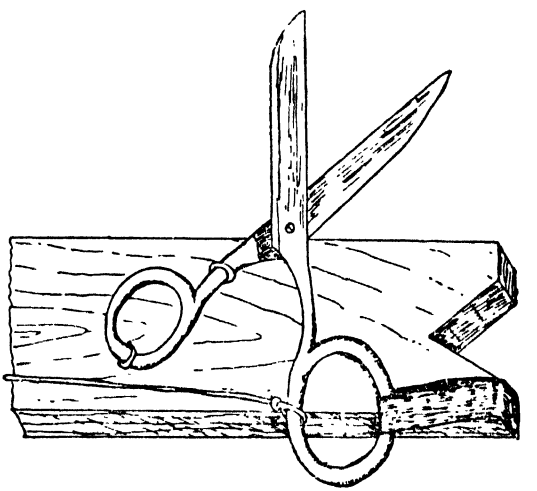
GARDENING HINTS

FRUIT PICKER 79
LAWN MOWER, CUTTING LONG GRASS WITH 79
PRUNER 80
SLUGS, TO KEEP FROM SMALL PLANTS 80
SOIL, BURNING OF . . . 80
WEED KILLER, NON-POISONOUS . 81
WEED-KILLING METHODS . . 82

FRUIT PICKER

The sketch illustrates how an improvised fruit picker can be made from a pair of scissors and the garden prop.

The scissors, preferably an old pair, are attached to the top portion of an extending clothes prop by two staples. A piece of strong elastic (a garter will do) is passed through the finger hole as shown, drawn over the top end of the prop, and fastened down by a drawing-pin or tack. A length of strong string is then tied in position and should be long enough to reach to the bottom of the prop.



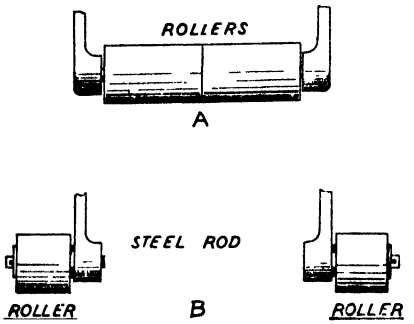
An Improvised Fruit Picker.

The apparatus, though crude, is quite effective. It should be pushed up through the branches of the tree until the stalk of the fruit comes between the blades of the scissors. A jerk of the string will then close the scissors and sever the stalk. After use, the whole can be dismantled in a minute or so, and the scissors returned to their domestic use again.

LAWN MOWER, CUTTING LONG GRASS WITH

A good method of cutting long grass with an ordinary lawn mower is to dispense with the usual arrangement of the wooden rollers, shown at A, in the illustrations. With this the rollers merely push the long grass down flat so that the cutter cannot reach them. A much better plan is that illustrated at B. Here a wooden roller is arranged on the outside of the axle bracket and a long steel rod connects the two brackets; the latter must be drilled through for the rods to bear in them

The rollers should be a little larger (but this is not essential) than the original ones and held in place by a washer and split pin at the outer end. This alteration will not affect the ordinary short-cutting operation of the mower, but will usually improve it.

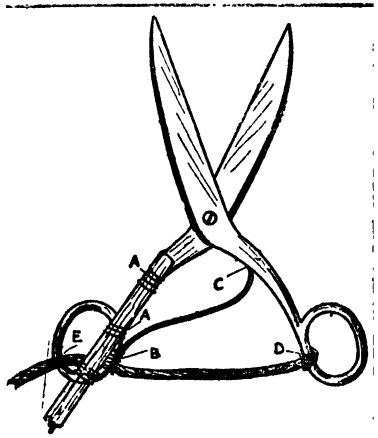


Alteration to Mower to Cut Long Grass.

PRUNER

It frequently happens that a choice rose or other flower, or even a fruit, is growing just out of reach, which it is desired to gather, and a pair of steps or ladder is not available. Also superfluous growths of creepers on the house are wanted to be removed.

A useful little implement may be made and turned to good account as a flower, etc., gatherer from a stout pair of scissors, shears, or secateurs. Firmly wire one arm of the scissors to a rod of bamboo or other wood as at A. To cause the jaws of the scissors to spring open, a piece of steel is wired on the arm at B, the other end engaging the other arm at C, a slot being cut in the end so that it may work freely on the arm. A strong cord is attached to one loop at D, and passed through the other at E. This completes the implement.



An Extemporised Pruner.

SLUGS, TO KEEP FROM SMALL PLANTS

Often small plants are spoiled by slugs or snails. This little idea is a means of preventing snails getting to the flowers. Take a strip of zinc about 6 in. wide and 2 ft. long. You will perhaps need it longer or shorter. Fasten the ends securely, then place it round the plant.

The use of unslaked or even slaked lime sprinkled around the plants offers another alternative method, whilst fine ashes and chimney soot have been proved very satisfactory. There are now several proprietary makes of slug- and snail-killing compounds on the market which are quite effective. These often consist of poisoned bran or chaff which is sprinkled near the plants to be protected.

SOIL, BURNING OF

The utility of burnt soil is well known to the gardener, and by courtesy of *Amateur Gardening* the following information is available.

In the burning process it is first necessary to secure a good body of fire, especially where the soil is heavy or clayey.

Arrangement of Bricks.—For a novice it is advisable to lay down ordinary bricks, as shown in Fig. I, arranging them so that a current of air from any direction will reach the centre of the fire A. BB shows the bricks placed on edge; more bricks should be put on the top to prevent the tunnel being blocked too soon. Allow a little space between the bricks, then some air will reach all parts of the heap as the latter increases in size. Start with a small quantity of clay, and so build up the heap gradually. The arrangement of bricks can be extended as the heap increases in bulk. At first the space marked out for the fire should be about 5 ft. in diameter, as shown at C. In the centre make a heap of coal, coke, and wood; dry oak faggot logs are the best. In Fig. II the heap is shown as first formed, and lighted at A. BB indicates the bricks on edge, which will, in due time, be covered with clayey soil, wood, and coal slack. When a big fire has been secured pile on more wood and a mixture of coal slack and clay. Continue to put on thin layers of the mixture until there is a big body of burning material, then add some leaves, weeds, hedge trimmings, and more soil.



Method Used for Soil Burning.

Fire Failing.—If the heap appears at any time to be failing in fire intensity, prod it in an upright direction with a stick, as shown at A in Fig. III; also put on a very thin layer of slack, as shown at B. Sometimes the heap will seem to be giving way more in one part than another; this indicates that the fire has burned more fiercely there, and worn away the crust. No open blaze must be allowed, and to prevent it put on a rather thick layer of damp leaves and rubbish. It is a wise plan to cover with a little damp rubbish every night for the first fortnight. The smoke—not a great amount—should come from the heap equally all over, or nearly so.

WEED KILLER, NON-POISONOUS

There are plenty of excellent weed killers, but the best are poisonous. One that is not poisonous is made by dissolving a pound of alum and

a pound of green vitriol in a gallon of water. This is bottled, and for use 1 part is mixed with 4 parts of water.

Another very effective and inexpensive non-poisonous weed killer is *sodium chlorate,* which is purchased from chemists or horticultural suppliers. It resembles ordinary domestic salt (sodium chloride) and is used by powdering any lumps and sprinkling lightly over the leaves of the weeds. It readily kills grass on paths and its effects are long lasting. A light sprinkling with water speeds up the action of the salt, or, alternatively, it can be made into a saturated solution and used with a fine sprinkler.

WEED-KILLING METHODS

Garden weeds belong to a fairly wide class, some with only surface roots and the others, e.g., dandelion, with long penetrating roots.

Surface-rooted weeds can be got rid of by most proprietary liquid weed killers, used with a watering-can for garden paths and a paint brush or injector for single plants on lawns.

An excellent weed killer can be made by purchasing raw phenol (the concentrated version of carbolic acid) and diluting it down about 20 to 40 times with water. This is both cheap and effective. For deep-rooted weeds, most weed killers only kill the leaves, and the roots then throw out fresh leaves. A good plan is to cut off the head of the weed, pierce a hole with a nail fastened in the end of a stick and introduce a little liquid weed killer. There is a tubular device having a reservoir for holding the weed killer and a penetrating point with central hole. The latter is pressed into the root of the weed and the liquid is forced by pressure into the hole thus made.

Surface weeds on paths can also be eliminated with a blow-lamp; there is a proprietary make of lamp designed especially for this purpose.

When using liquid weed killers, it is best to apply these after a shower, or a previous watering of the surface. Care must be taken not to allow subsequent rains to wash the weed killer into any adjoining flower beds or roots of shrubs, etc.

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BARBOLA WORK

To those with a longing to express themselves in form and colour, Barbola work offers splendid opportunities. By it many everyday objects can be enriched and beautified—furniture, picture-frames, lampshades, bowls, accessories of the toilet, to mention only a few. Also a wide range of white wood and papier maché articles suitable for decorating with barbola can be obtained; these, and other articles which have an unfinished or badly finished surface, are first rubbed down with fine glass-paper, and then given two coats of lacquer, the first coat being allowed to dry and then rubbed down before the second is applied; a third coat can be added if desired.

The Materials.—Barbola (or Gesso paste) is a plastic substance of about the consistency of putty, which is moulded into the form required, glued to the article to be decorated, and, when quite hard, painted. A little Gesso powder is used during the modelling to prevent the paste from sticking to the fingers or piece of glass on which the modelling is done. Water colours are used for the painting, with a coat of matt or glossy spirit varnish to make the colour permanent and give a good finish; or oil colours may be used, in which case no varnishing is necessary. Gilding, bronzing, and silvering are also effective, and yet another method is simply to varnish, leaving the barbola in its natural cream colour. The barbola is attached to the object with liquid glue, this being done immediately the modelling is completed.

Equipment.—Fig. A shows the set of three wooden modelling tools specially designed for barbola work. They are by no means essential, as a greater part of the moulding can be done with the fingers and the remainder with any implement of suitable shape that lies to hand, such as a penholder or paper knife, but as they can be bought cheaply, their cost is not a serious item, and they are certainly very handy. A brush for applying the glue, another for the colour, and a third if varnish is used, with a piece of glass to provide a flat surface on which to model, are all the items that will be required.

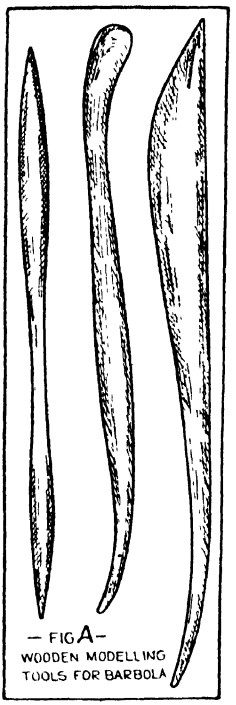
Designs.—In the matter of designs there is practically unlimited choice, and if the object it is proposed to fashion is somewhat large there is no

reason why a roughly shaped piece of wood should not first be glued to the ground, and the barbola, in turn, glued to this. Fruits and flowers in natural form and colouring are, perhaps, the most popular, but conventional designs, lettering, and models of natural and other objects of all kinds, including human figures, can be undertaken. The three designs given here are offered simply as suggestions for the beginner, and it is not claimed that they are true to nature. When proficiency has been attained the realistic worker, with the natural object or a good reproduction before him, will be able to produce a model difficult to distinguish from the original.

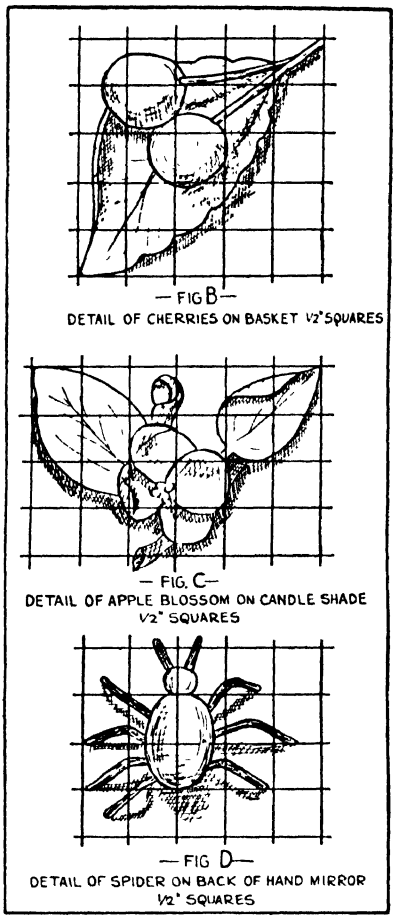
A Few Useful Hints.—Take from the tin sufficient paste for the work in hand only, replacing the lid of tin and keeping it in a cool place when not in use. The lower parts of a design such as the leaf in Fig. B should be modelled first. For flat objects such as leaves press out the paste between forefinger and thumb, then lay on the glass and complete the modelling with the forefinger and the appropriate modelling tool, putting in the veins with the pointed tool, turning up edges of leaves with the flat tool, and so on. Stems and globular objects such as the cherries are made by rolling the paste with the palm of the hand. When the design has been glued to the base the work is put aside for two or three days in a moderate temperature to dry and can then be painted. Red and green were used for the cherries (Fig. B), pink, green, and brown (for the stem) in the apple blossom (Fig. C), and brown for the spider (Fig. D). High lights are obtained by using a lighter shade of the particular colour. The Plate facing this page, illustrates the objects described.

BASKET WORK

The very ancient craft of basketry survives to-day both as a trade and as a popular homecraft. In the former case, willow and rattan cane are used to produce articles most of which are beyond the scope of the amateur; but by leaving willow alone—at least until some degree of proficiency has been attained—and using pulp or centre cane in conjunction with the other easily worked materials which are available, many articles combining artistic merit with usefulness and fitness for purpose can be produced by the home worker, using methods similar to those employed by professional basket makers. Then there is raffia basketry, which employs the coiled method as practised by the North American Indians and other primitive races. This class of work is more closely allied to needlework, and, therefore, very suitable for women, especially as it affords greater scope for colour effects than does the cane work. The manipulation of cane demands fairly strong fingers, whereas raffia work requires no greater manual exertion than that needed for sewing or knitting; both kinds of basketry are, however, largely practised by women, and there is no reason why any member of the family should not find both pleasure and profit in the exercise of one or both of them. The quickest way to mastery of the work is to take a short course of lessons from an expert, but the following instruc-



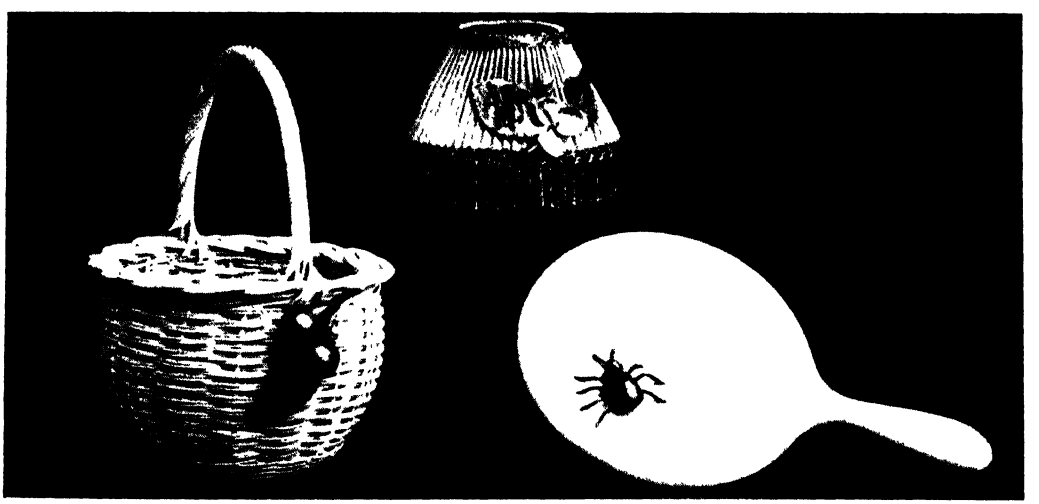
— FIG A —
WOODEN MODELLING
TOOLS FOR BARBOLA



— FIG B —
DETAIL OF CHERRIES ON BASKET ½" SQUARES

— FIG. C —
DETAIL OF APPLE BLOSSOM ON CANDLE SHADE
½" SQUARES

— FIG D —
DETAIL OF SPIDER ON BACK OF HAND MIRROR
½" SQUARES



BARBOLA WORK.

tions if carefully studied and put into practice will enable the beginner to master the rudiments of the two branches of the craft without a teacher.

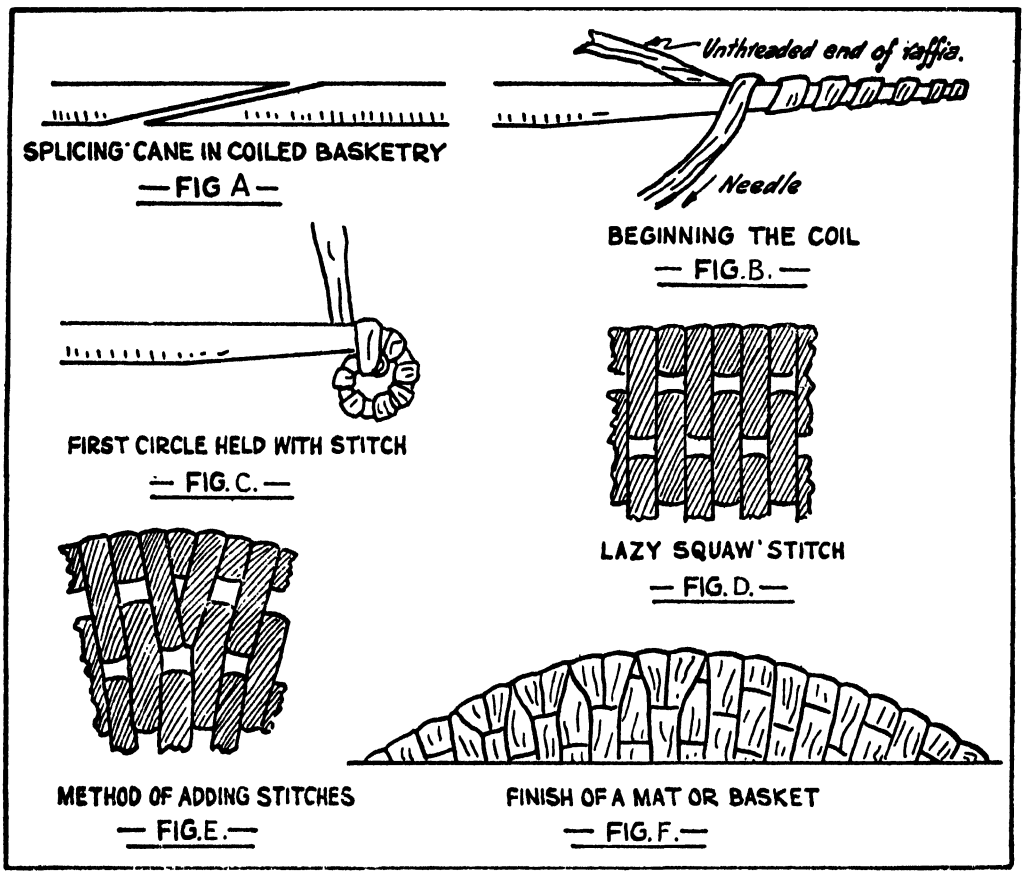
Raffia Basketry.—*Materials*: Raffia is the inner skin from the long leaves of the African raffia palm, and is superior to the common bast used by gardeners, with which it is sometimes confused. Raffia for basket making should be soft and pliable, of a good width and in long strands so that the number of joins is reduced to the minimum. Harsh, stringy material should be avoided as it is wasteful, difficult to work, and gives poor results. The raffia, which can be obtained from most fancy shops, is sold as natural, bleached (pure white), and coloured, at relatively low prices, and in bundles of various sizes. Glycerine-dyed raffia is of a brighter colour than ordinary dyed raffia, both being sold at about the same price. Before beginning work it is a good plan to sort the raffia, putting aside the very narrow and short pieces (these can be used for the core of the coil instead of cane), and removing any hard outer edges from the remainder which are then split to a uniform width of about $\frac{3}{8}$ in. For the foundation or core a number of strands of raffia can be used as suggested above, but this necessitates continually adding new strands to maintain an even thickness, and causes the work to be flabby. The best core is No. 6 pulp cane spliced when the end of a length is reached as shown by Fig. A.

A needle and a pair of scissors are the only implements needed for raffia basketry. A straight needle of the rug or tapestry type, about No. 18, is used, this being easily obtainable from a fancy shop.

Round Table Mat in "Lazy Squaw" Stitch.—This simple example is an excellent one with which to make a beginning, as it embodies principles which apply to all forms of coiled basketry. It consists of a spiral coil beginning at the centre and finishing at the outer edge, each round being attached to the preceding one by means of long stitches alternating with short ones which pass round the core only. Having threaded the needle with a strand of raffia, take a length of No. 6 pulp cane and make a long taper at one end, shaving the cane for about 2 in. so that it comes down to about half its ordinary thickness at the end. Dip this in hot water to make it pliable, lay the unthreaded end of raffia along the cane, and bind round both cane and raffia for about $\frac{3}{4}$ in. as shown by Fig. B. Now coil the bound end into as small a circle as possible, and fasten by a stitch as shown by Fig. C.

"Lazy squaw" stitching (see Fig. D) is now employed until the mat is of the size desired, the stitching being done from right to left with the unused cane core or "tail" on left of worker. Fig. D shows straightforward "lazy squaw" such as can be used in the upright sides of a basket, but in a disk-shaped piece of work such as the present it is necessary to introduce new long stitches in each successive round. This is accomplished, as shown by Fig. E, by putting two long stitches into the same hole. (For the sake of clearness, spaces are shown between the coils in Figs. D and E. In actual work no gaps should be visible.) When the first length of raffia

has been nearly used up, the end of a new length is bound in with the coil for an inch or so, the needle is transferred from old to new length, and stitching continued with the latter, the old end being bound securely in as the work proceeds. The method of finishing off a piece of coiled basketry is shown by Fig. F, where it will be seen that the end is bound tightly to



the preceding round after being cut to a long taper. The raffia is finished off by one or two ordinary stitches on the under side of mat, that is, the side farthest from worker. During the progress of the work, all loose ends should be trimmed off with the scissors; and a final trim up completes this serviceable and artistic piece of coiled basketry.

Oval Mat in "Lazy Squaw" Stitch.—This has straight sides and rounded ends, each end being identical with the half of a round mat, and carried out in precisely the same way, adding new stitches as required. The straight sides consist of simple "lazy squaw" stitching as shown by Fig. D. In beginning oval mats the end of cane is not tapered, but bent as shown by Fig. G, after it has been soaked in hot water for a few minutes

to make it pliable. The relative proportion of length and width in the finished mat is determined by the length of cane before the first bend, which should be equal to the difference between the length and width of the finished mat. For instance, to obtain a mat 8 in. by 5 in. the length of the piece of cane marked A in Fig. G will be 3 in. The sharp bend is now bound closely with raffia, and the binding continued along the two canes, a space being left between each lap when doing these as shown in

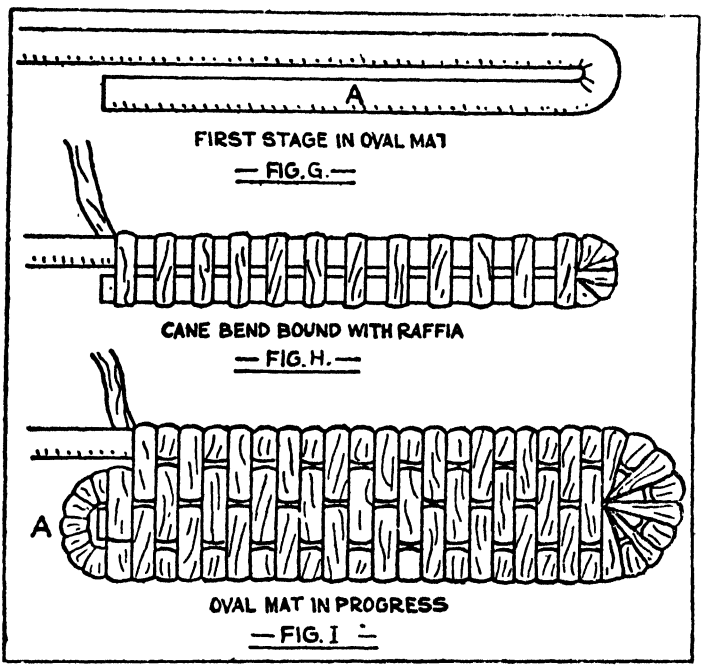
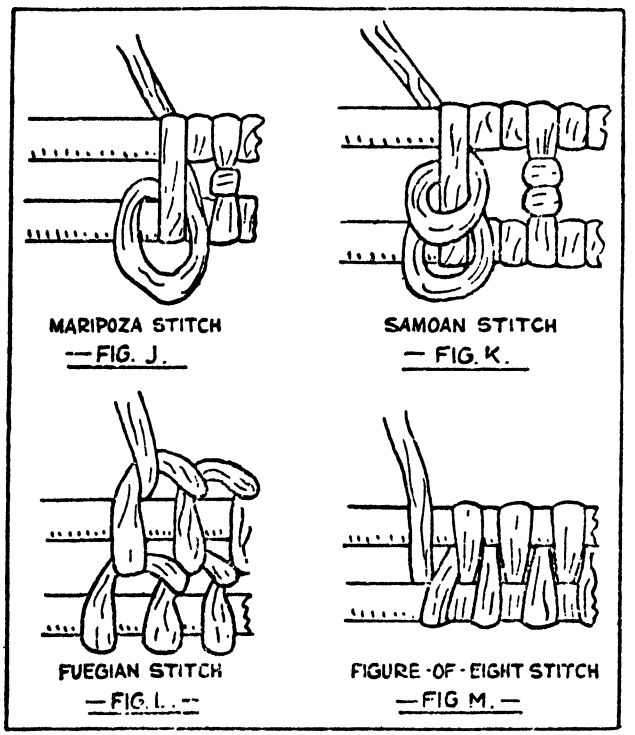


Fig. H. Then the cane is bent round, and the bend closely bound as shown at A, Fig. I, after which "lazy squaw" is worked along the straight side and for the remainder of the mat.

Raffia baskets are simply continuations of mats, the coils being turned up as the work proceeds to form the sides. There are several other stitches besides the "lazy squaw," the principal ones being shown by Figs. J, K, L, and M, from which the reader who has mastered "lazy squaw" will have little difficulty in learning them.

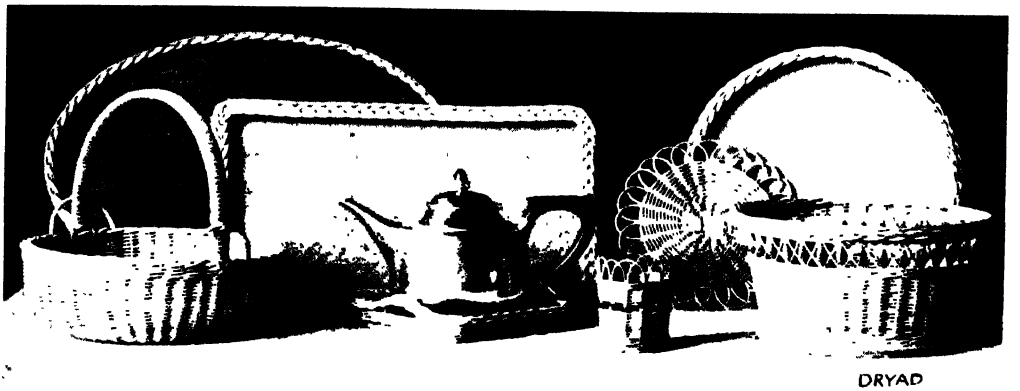
Cane Basketry.—Pulp or centre cane is the inside portion of the rattan cane, cut by machinery into round, half round, and flat strands of varying sizes. The chief kind used in cane basketry is the round, which can be bought in 1 lb. bundles, and also in smaller quantities, from cane merchants and handicraft material suppliers. The cane is numbered according to size, from No. 000, the very smallest, up to No. 16, which is nearly as stout as a lead pencil, and is used mainly for the inner core or "bow" of a cross

handle. To enable the cane to be easily worked it must be damped, but there is no need to soak it for a long period; about five minutes under water is sufficient, after which it should be covered with a cloth and left for an hour or so to mellow. As the work proceeds the outside of the cane quickly dries, so that it is necessary to have a bowl of water and a sponge or small piece of cloth handy with which to swab the cane in use occasionally. In regard to the price of cane this is sold by the pound, the price rising from this towards the smallest size, and lowering towards the largest. The cane referred to is natural, but it can also be had dyed in any colour, and additional materials which can be introduced with pleasing effect into cane work are: flat and half-round enamelled cane, plaits of raffia, rush, straw, wooden beads, and seagrass; and for the exterior decoration of baskets, barbola, raffia, wool, and other decorative mediums. Silk, satin, etc., are used for lining baskets such as work-baskets, and green baize for knife and plate baskets.

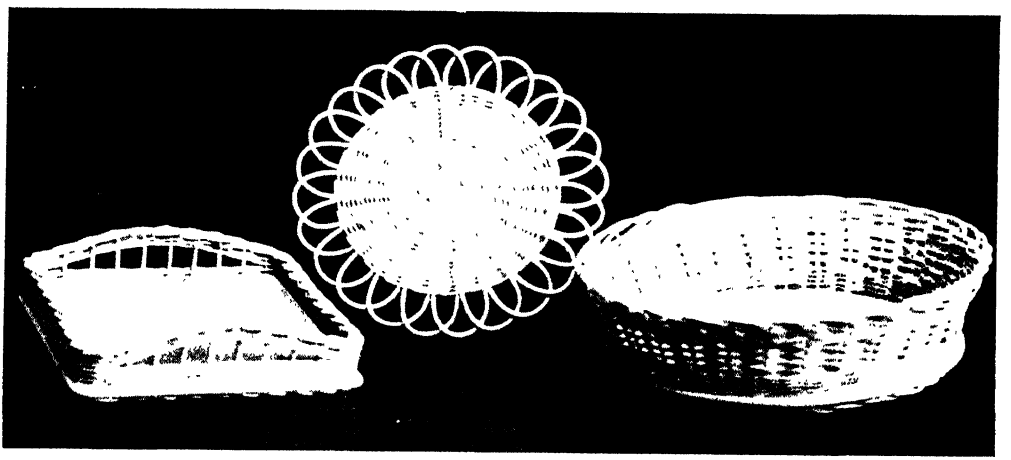


Tools for Cane Basketry.—These are shown in Fig. N, their several uses being as follows: round-nosed pliers for pinching the cane when it is required to bend it at right angles; spring shears for cutting the cane into lengths; beating iron for tapping the weaving close as the work proceeds; bodkin for making a hole or passage in the work when it is required to insert an end of cane; knife for pointing canes and cutting off surplus ends when the work is finished. Basket work is essentially a hand craft, and most of the work is, therefore, performed with the fingers, so that it is almost entirely upon manual dexterity unaided by the use of tools that the excellence of the work depends.

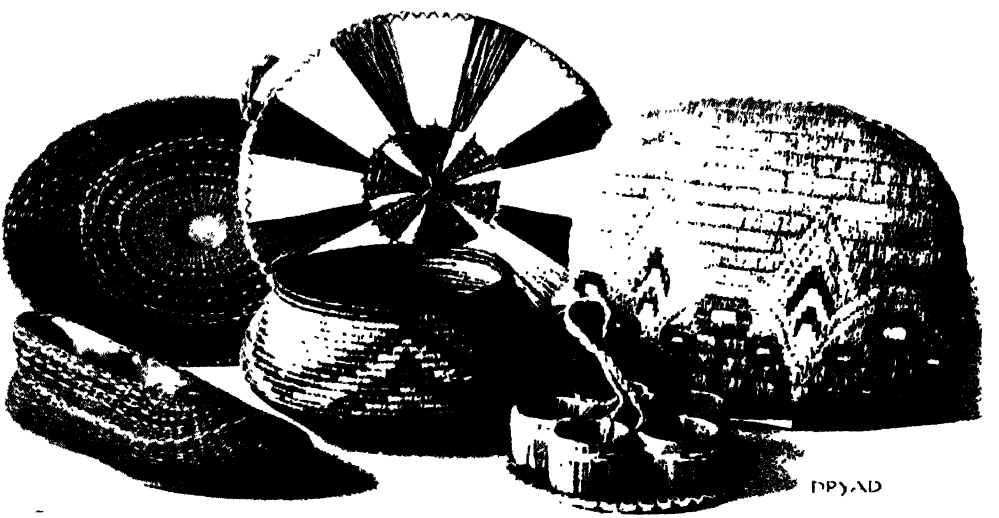
Fig. O shows the various weaves commonly employed in simple home basketry. The thinner canes used for weaving are worked with the right hand before and behind the stouter upright spokes or stakes as they are called, and it is from these that the finishing border is formed. Randing



SOME TYPICAL ARTICLES ILLUSTRATING CANE BASKETRY WORK (*Dryad*)

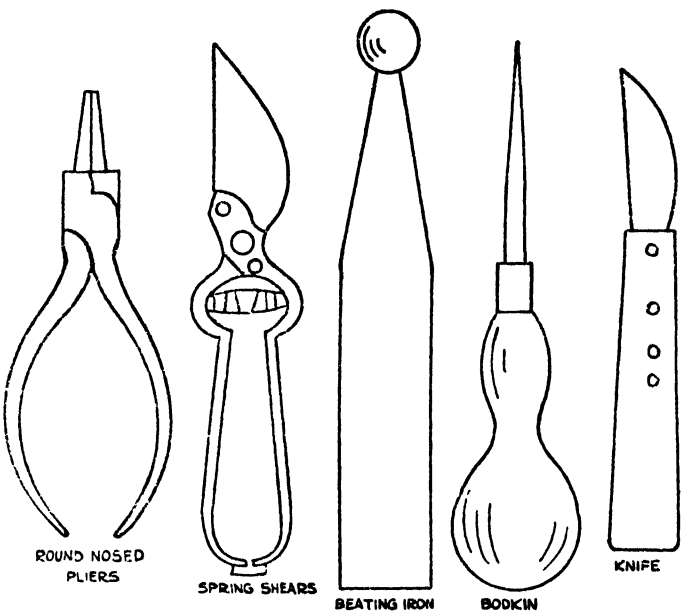


TRAY MAT AND SPAETLOW BASKET (*Dryad*)



TYPICAL EXAMPLES OF RAFFIA BASKETRY (*Dryad*)

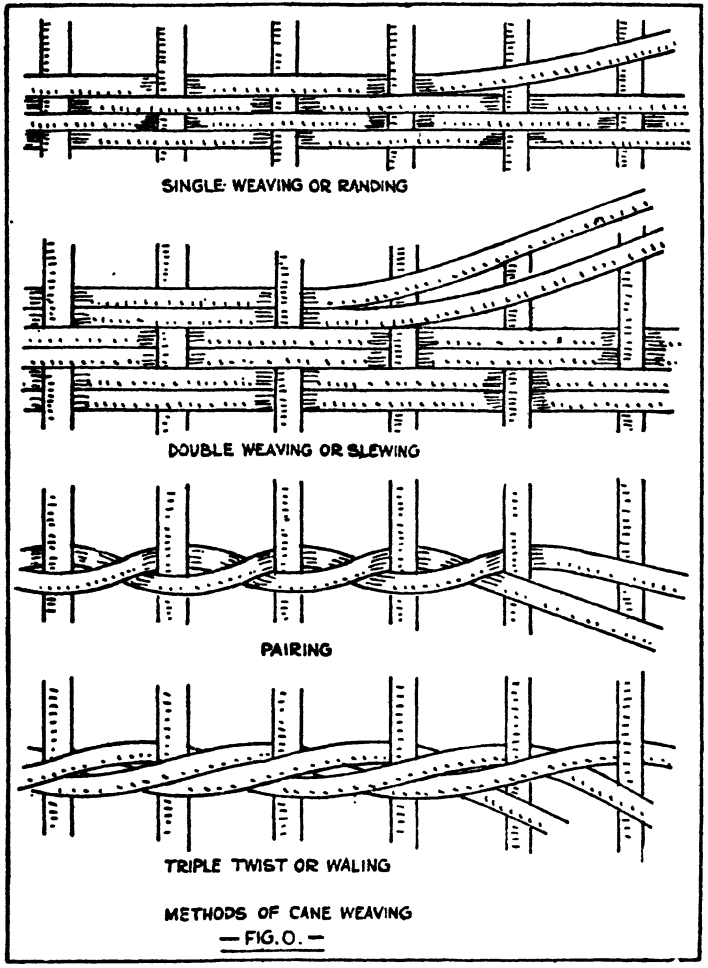
is working a single cane before and behind the uprights, which must be odd in number for this and also for slewing, so that when each new round is begun the cane or canes will pass in front of the uprights which the previous round passed behind, and vice versa. Slewing is worked in the same way as randing except that two canes are worked as one. To join in a new cane in randing or slewing, simply leave the old end resting against an upright at the back or inside of the work, and lay in the end of a new piece so that it rests against the same upright, also at the back or inside of the work. When the piece of work is completed, these and all



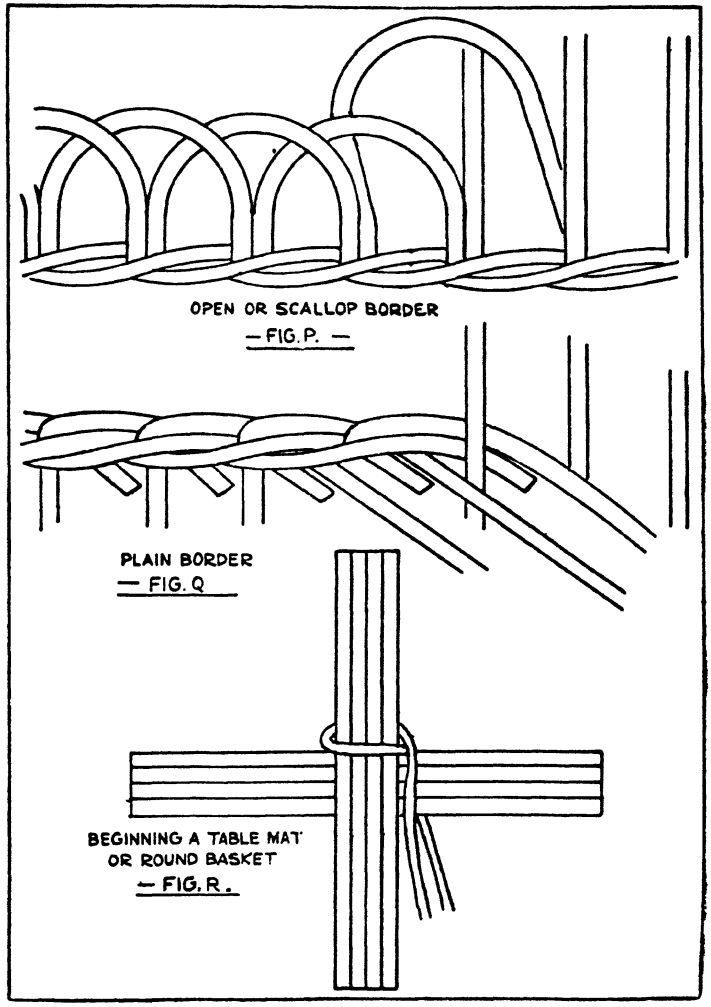
TOOLS FOR CANE BASKETRY
— FIG. N —

other surplus ends are cut off fairly close, but not so close that they will spring through to the other side of the work. Pairing is worked with two canes, the left-hand one being taken each time, passed over the other, behind the next upright, and out towards worker again, this being repeated with each cane alternately. The joining in of new canes in pairing and slewing is accomplished by pulling the old end to the left and pushing the new end through close alongside it, the new end being left on the back or inside, and the old end on the outside or front. Waling is worked in a manner very similar to pairing, the left-hand cane of the three being taken each time, passed over the other two, behind the upright, and out to the front again.

Table mats are made in the same way as basket bases except that the



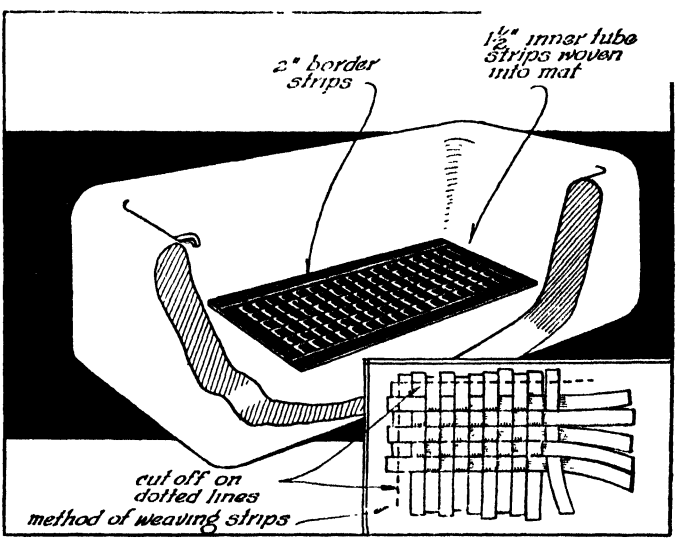
METHODS OF CANE WEAVING
— FIG. O. —



former are bordered when the required diameter is reached, whereas the "spokes" of a basket base are turned up to form the sides, or cut off close and "side spokes" pushed in alongside them. Fig. R shows how the work is begun by piercing half the spokes in their centres, and threading the other half through them. A length of thin cane is then looped round one of the groups, and then worked round and round as pairing, the spokes being opened out into singles as the work proceeds. The sides of a basket are begun with two or three rounds of waling to form what is known as the "upset"; and this is followed by the weaving of the sides, after which another round of waling is worked and then the border, two forms of which are shown by Figs. P and Q. Beginners are recommended to use wooden bases for the first few attempts, baskets on these being constructed in the same way as cane-edged wooden trays and teapot tiles. The trays and wooden bases have holes bored all round through which the uprights are threaded. The ends of these are then formed into a border on the under side, after which the work is turned over, sided, and bordered.

BATH MAT FROM RUBBER INNER TUBES

Use two or three old inner tubes, converting them into rubber mats for use in the bathroom or bath tub. Red rubber makes the most attractive mat. Lay a three-foot rule on the flat inner tube, and rule off 1½ in. strips with a pencil, then cutting them out with shears. Each tube will yield several strips, cut lengthwise. For the bathtub shower mat, you will want one about 10 to 12 in. wide and about 20 in. long. Cut out 2 in. strips for the borders of the mat, fastening the free ends of the woven pad to the under side of the border strips using rubber cement and applied pressure. Be sure to clean the surfaces of the rubber with petrol before coating them with the cement. The method of weaving the rubber strips is shown in the corner detail drawing. If smaller mats are desired, use strips from ½ to ¾ in. wide. The corners of the border strips are fastened together at the corners, with rubber cement, as shown.



A Useful Bath Mat Made from Rubber Inner Tubes.

BEAD WORK

The number of ways in which the ever-popular bead is pressed into service is truly remarkable, but the reason for its popularity is not far to seek, for it can be had in such a variety of shapes, sizes, materials, and colours, and lends itself so readily to all sorts of decorative purposes, that its appeal is universal.

Necklets and Bracelets.—For personal adornment bead necklets in infinite variety can be bought ready made, or strung at home, the latter course enabling the wearer to secure exactly the effect she desires. These can be made from inexpensive glass and wooden beads, but for those who can afford them beads of crystal, rose quartz, jade, lapis, agate, cornelian,

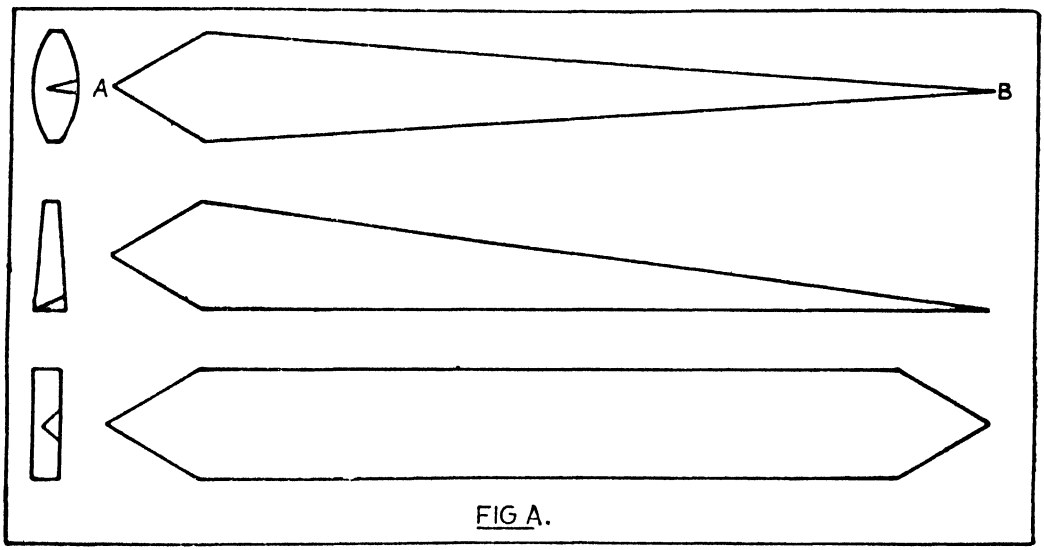


FIG A.

Illustrating Method of Making Paper Beads.

and other semi-precious stones are obtainable. The beads are strung on fine silver or gold cord, silk, macramé twine, linen thread, mercerised cotton, wire, or catgut, according to the size, value, or transparency of the beads and the taste of the worker. Strings with a threading wire attached to one end can be bought, and the threading wires can be obtained separately, as also can fine long needles for bead work. Necklet strings can be fastened by a neat reef knot; by means of two loops bound with very fine wire; or by the use of a clasp. Bracelets or bangles can be made in a similar way to necklets.

Paper Beads.—The making of paper beads is a delightful occupation the cost of which is practically nil. All that is required is a pair of scissors, a stout knitting needle, some gum or paste, and some paper. The paper can be plain, in which case the beads may be painted with oil colours; or wall-paper or coloured illustrations such as magazine covers and calendars

can be used, the rolling up of the paper to form the bead resulting in interesting and bizarre designs. A coat of gum arabic or clear paper varnish will improve either kind of bead. Assuming that a magazine cover is being used, cut a strip from it lengthwise about 1 in. wide, and point one end (A in top diagram, Fig. A) by cutting off the two corners, starting the cuts an inch from the end. Beginning at the same two places, cut the remainder of the strip into a long taper, the two cuts meeting to form a point at the other end (B in diagram). Now coil the strip tightly round the knitting needle, beginning at A, and having the coloured side of paper outwards. See that the winding is kept even so that the sharp point B finishes in centre, where it is secured with a drop of paste or gum. Withdraw the needle and you have a bead similar to that shown in the diagram. Other shapes are shown in Fig. A, and sizes can, of course, be varied at will. These beads can be used for practically all the purposes for which ordinary beads are adapted.

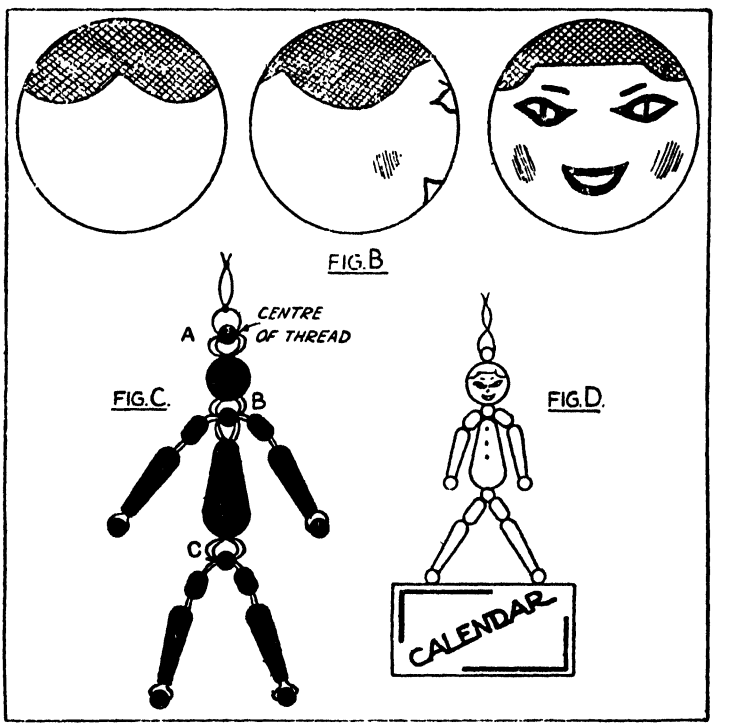


Fig. B.—Head of Bead Figure. Fig. C.—Method of Stringing Bead Figure
Fig. D.—Bead Calendar Man.

Bead Figures.—Wooden beads, large and small, in a variety of shapes and colours, or plain for colouring by the worker, can be obtained at most fancy shops or from handicraft material suppliers; and one of the most interesting ways of using them is in the making of quaint little bead figures. These have been popular lately as mascots and for hanging on the wall with a calendar attached to the legs. The bead for the head should be a round one of about $\frac{1}{2}$ in. or $\frac{5}{8}$ in. diameter, and that for the body a large oval or pear shape; the remaining beads can be chosen to suit the fancy of the maker. The head should be painted on the lines suggested in Fig. B, and the body can be painted also if desired.

Fig. C shows the manner in which the beads are strung together. A long strand of cotton is threaded into two fine darning needles, one end in each

needle. One of the needles is then passed through the small round bead at top of figure (A, Fig. C), and this bead is drawn along to centre of cotton. Both needles are now passed through head of figure, and then in opposite directions through bead B, Fig. C, which, in common with beads A and C and the beads at ends of arms and legs, is placed at right angles to the others. Both needles are now passed through the body, and then in opposite directions through bead C, after which one is used for the left leg and one for the right, the needle in each case being passed back through bead C, up through the body, and then through bead B, when the arms are threaded in the same way as the legs. Finally, when each needle has been passed again through bead B, both are taken up through head, through bead A, and then the cottons are knotted together to form a loop for hanging purposes. The figure is strung fairly loosely so that the limbs dangle about and assume absurd and grotesque attitudes. Fig. D shows the completed bead man with calendar attached to his legs.

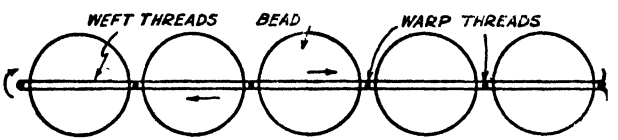


FIG.E.

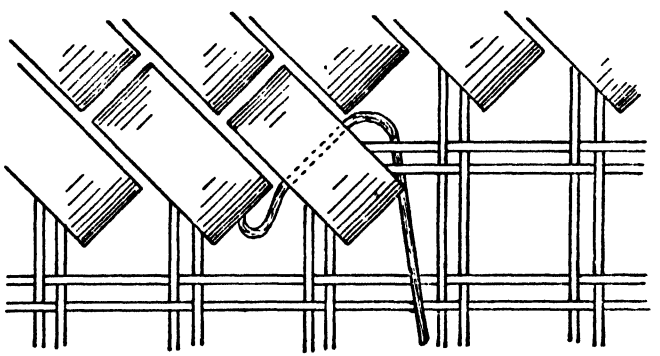


FIG. F.

Fig. E.—Cross-section of Bead Weaving. Fig. F.—Bead Work on Canvas.

The Bead Loom.—Several designs of frames or looms for bead weaving can be obtained, but the principle employed is the same in all. A set of threads is stretched from end to end of the loom at such a distance apart that a bead just fits between each two. Beads sufficient for one row are threaded on to a long thin needle, threaded with stout linen thread, and the row of beads placed under the warp threads so that each bead can be pushed up between two threads. The needle is drawn through, the end of the weft thread having previously been tied to the outer thread of the warp, and then, while the beads are held with the forefinger of the other hand, the needle is passed back through them, but this time above the warp threads, thus holding the row of beads securely. Fig. E illustrates the method. The second and succeeding rows are worked in the same way until the piece is of the length required. Mercerised cotton is suitable for the warp threads, which are cut to the length required with a few inches over for finishing the ends.

Perhaps the best and quickest results, generally speaking, are obtained by weaving with small wooden beads, but several shapes and sizes can be used, especially in necklets woven on the loom. By using several colours, and threading each row in a definite order, pleasing designs can be introduced, from simple ones such as squares and diamonds to more elaborate motifs, initials, etc.

It is better to weave narrow strips than wide ones, as the former can easily be sewn together for making bags, card cases, and other articles requiring a fairly wide piece of weaving.

Bead Work on Canvas.—This work is very suitable for making bags, blotters, and similar articles, the canvas making a strong backing for the beads. Ordinary rug-making canvas is used, and beads of the shape shown in Fig. F are most suitable, although round beads are sometimes used. It is very important that the size of the beads used shall correspond with the meshes of the canvas; if the beads are too small the canvas will show through, and if they are too large the work will not lie flat. The work is done in rows from left to right, and if a design is to be introduced, this will be stencilled direct on to the canvas, or drawn on squared paper, each square representing a bead. The Plate facing page 98 illustrates this by means of a simple swastika design. Squared paper is useful also for planning designs for bead weaving on the loom.

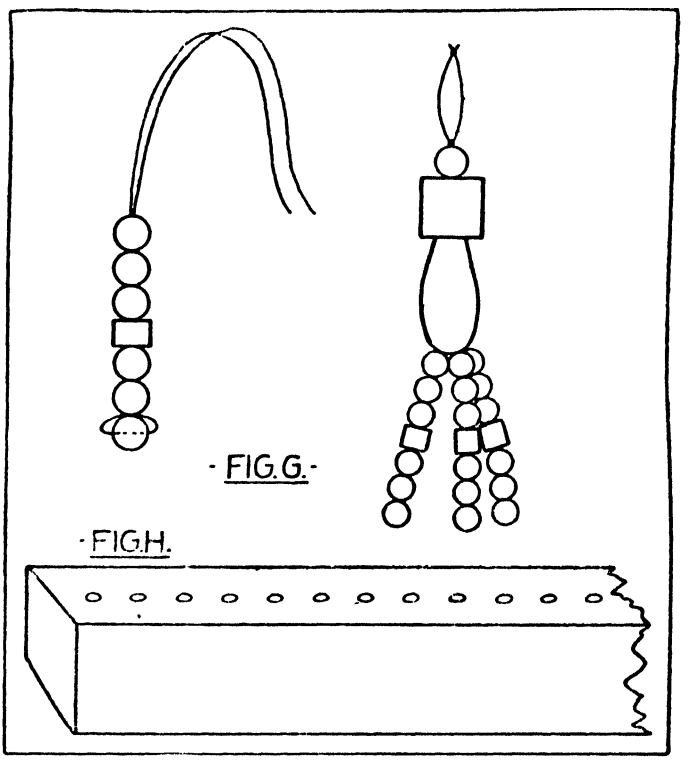


Fig. G.—Bead Tassel. Fig. H.—Wooden Bar for Bead Curtain.

Bead Tassels.—Used for the adornment of hand bags, lampshades, and other articles, bead tassels are easy to make, and can be produced in form and colour to suit the article they are intended to decorate. Fig. G illustrates the method of threading, the "tails" being each separately threaded first, and then all the ends of thread taken together through the beads forming the main piece. In the making of tassels, and also in other

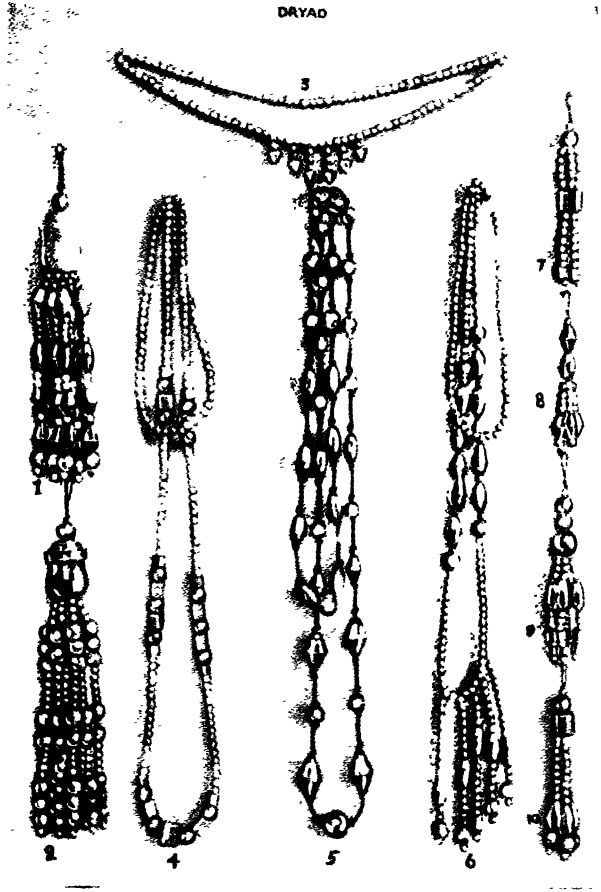
kinds of bead work, ends of thread may be waxed with beeswax to enable them to be easily passed through the beads without the use of a needle. When the threads of each "tail" have been taken through the main beads they are separated into two, the threads of each half twisted together, a knot made immediately above the beads, and then another one higher up to form a loop for hanging purposes.

Bead Curtains.—These pleasing and popular items of household equipment can easily be made at home at small cost. First of all a wooden bar, square in section, each side being from ¾ in. to 1 in., and the same in length as the width of the window or other space which the blind is to occupy, is required. This, as shown by Fig. H, has small holes bored at intervals of from ⅜ in. to ½ in. to take the macramé string upon which the beads are threaded. Bars can be bought ready made or easily constructed by a carpenter or handyman. They are painted or enamelled black or any colour to tone with the beads used, the latter, of course, being selected to blend with other furnishings in the room. The bar can be suspended by means of screw rings inserted in its upper face.

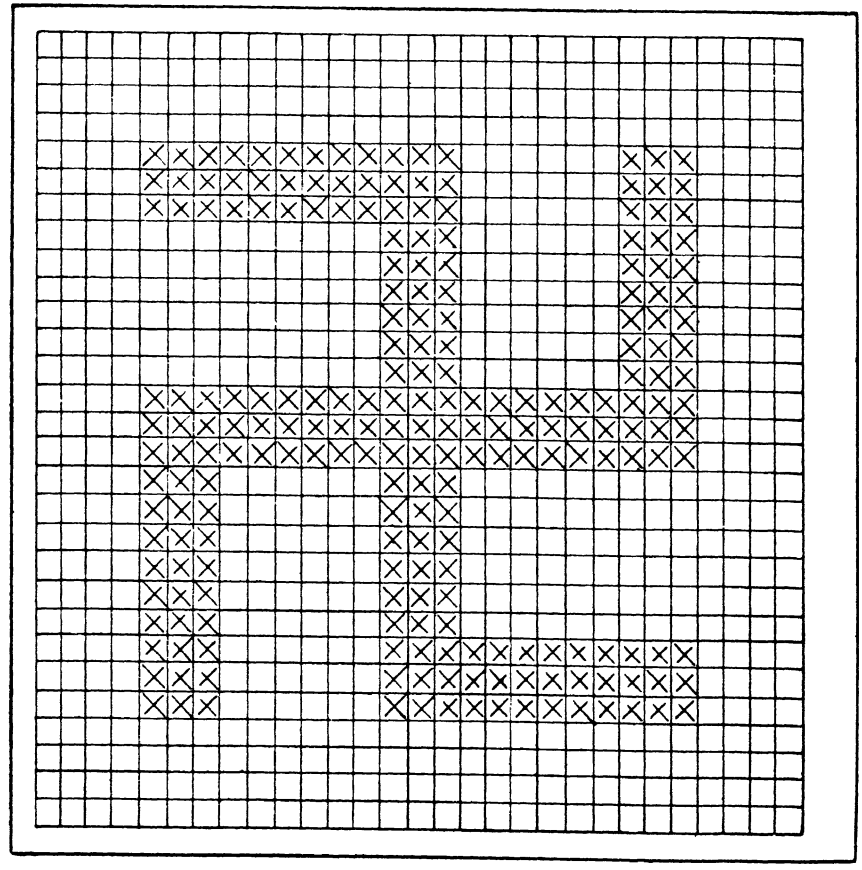
Two kinds of beads are generally used—glass "pea," which are round, and tubular or "bugle," either 1 in. or 2 in. in length. These can be had in many colours, as can also the macramé string. The colour of the latter is not a matter of importance when it is entirely covered by beads, but in some designs portions of the string are left bare, necessitating its being of suitable colour. The making of a bead curtain is begun by cutting the macramé string into lengths double the length the curtain is to be with 6 in. over. Each length is then passed up through a hole in the bar, down through the next hole, and its ends brought level, each length of string thus making two strings of equal length hanging down from the bar. The strings are prevented from moving by inserting tintacks along the top of bar, each tack passing through the loop of string between two holes. The threading can now be proceeded with, each string being dealt with in turn, the beads being passed on to it in the order necessary to produce the design which has previously been determined upon. The beads are prevented from slipping off the string by a double knot after the last bead has been put on.

Beads are utilised in innumerable ways in dressmaking, being either stitched on separately or threaded first and then stitched on. In knitting and crochet work, too, beads can be effectively introduced. Beads crocheted round the edge of a net or muslin jug cover are useful as well as ornamental as they act as weights to keep the cover in position. In cane basketry wooden beads are threaded on to the upright canes as the work proceeds, and wooden and other beads can be added to both cane and raffia baskets after the basket has been made. A bead edging to a cork mat is very effective, and so also is an edging or fringe either of single beads or bead tassels to a lampshade.

Charming bead flowers can be made by threading beads on wire, and then bending to the shape required. A simple forget-me-not is produced



Typical Examples of Bead Work for Decorative Purposes.

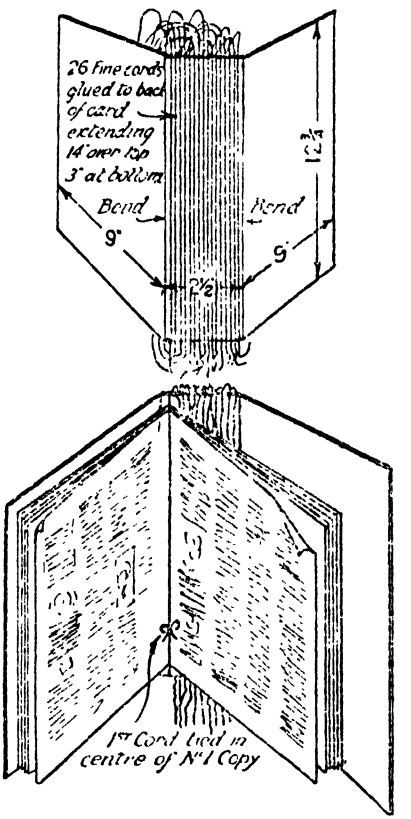


A Simple Swastika Design for Canvas Bead Work

by threading four or five round beads on to a length of wire, forming the beads into a circle, and then twisting the ends of wire together. Seed bead work, as it is called, is done on similar lines, tiny beads being threaded on wire, and formed into dolls' furniture and other little models.

BINDING PERIODICALS

The method of binding periodicals shown in the accompanying illustration is very useful, as it permits of easy access for reference and allows each copy to be bound as received without in any way defacing it. The cover may be used for successive volumes when the first volume is removed for binding. The cover may be made from strong card, and after the cords have been glued in position it may be folded and covered with leatherette or imitation-cloth paper.



A Binding Method for Periodicals.

BIRD STUFFING

To Skin a Bird.—Plug the throat, mouth, and nostrils with clean cotton wool to prevent any blood and mucus escaping to damage the feathers. Break the wing bones close to the body. Lay the bird on its back on a clean sheet of paper. Open out the feathers on the breast, and with a sharp pointed knife, either a penknife or a small knife used by bootmakers, make a clean cut first through the skin from the middle of the breast to the vent, taking care not to cut through into the abdomen. Dust a small quantity of common flour or plaster of Paris, which is better, along the cut to prevent the feathers from sticking. Gently raise the cut edges of the skin with the back of the knife or a scalpel, and gradually work the skin off, dusting on more flour during the process.

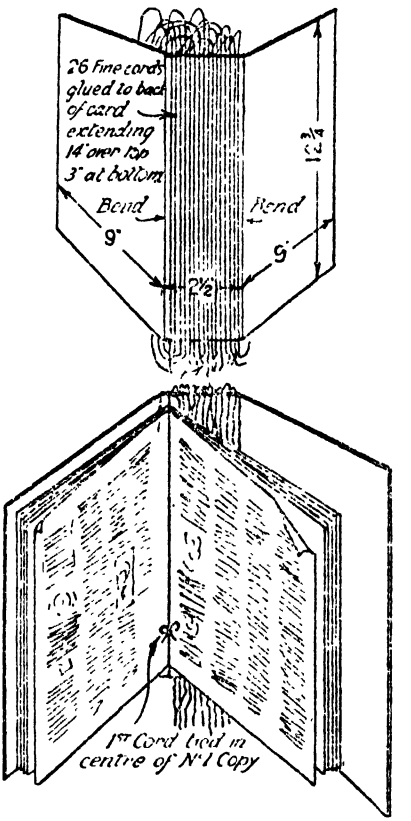
As the legs are reached push each one up through the skin, and sever with a pair of small scissors just below the knee joint. Work the skin off to the tail, the root of which must be cut through with the scissors, being careful not to cut through the roots of the tail feathers, or they will fall out.

Now work the skin up over the back until the wings are reached, which must now be severed at the already broken bone; continue the skinning, turning the skin inside out as the work proceeds, right up over the skull to the base of the beak. Be careful as the ears and eyes are reached not to

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cut through the skin, but to cut the eyelids clear from the membrane surrounding the eyes. Detach the body from the skin by cutting clean through the base of the skull, leaving an aperture at the back through which the brains must be extracted. Remove the eyes, also trim off the flesh that remains on the leg and wing bones. Tie a piece of thread 4 in. long to the end of each wing bone.

The skin is now ready for preserving; arsenical soap may be used, or a paste consisting of half each of finely powdered burnt alum and saltpetre with double the quantity of whiting, mixed with water and applied all over the interior of the skin and skull with a small camel-hair brush.

In the case of ducks, woodpeckers, and one or two other kinds of birds the skin cannot be turned over the head as the skull is larger than the neck. So a cut must be made either alongside the face, just under the eye, or along the top of the skull, and the head skinned out separately after the body is skinned.

The skin is now ready to be turned right side out again. This must be done very gently over the skull, or the skin will split.

Lay a piece of cotton wool along the back of the skin inside, and tie the wing bones together on the top of the cotton wool, which will shape up the back and hold the wings in position.

To Stuff the Skin.—Take a piece of soft galvanised wire about twice the length of the bird, turn a loop in it near one end, and make an artificial body round the loop with fine wood wool or tow, binding it into shape with thread or shoemaker's hemp. Make the artificial body slightly smaller than the bird's body taken out. File the projecting long end of the wire to a point. Push this wire carefully up the neck and through the skull far enough to insert the body into the skin of the bird, drawing the skin over the body (Fig. A).

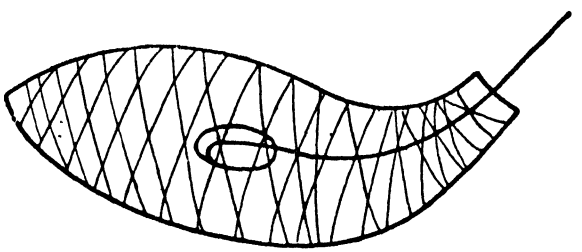


Fig. A.—Artificial Body for Birds.

Take two other lengths of wire for the legs, a few inches longer than the leg and body combined, point one end and carefully push this pointed end up through the sole of the foot and along the back of the leg and thigh inside, through the artificial body, and clinch the pointed end back firmly into the body. Cut off the projecting wire from the skull and use it for fixing the tail. Push this wire through the stump of the tail from outside into the body firmly, when it will hold the tail in any desired position.

Arranging the Body.—Straighten up the feathers, gently pull the skin into its proper position about the body. Pad out the breast lightly with wool and other parts where necessary. A pair of watchmaker's tweezers will be found most useful both for drawing the skin over the body and for inserting small pieces of wadding. Sew up neatly the incision

in the breast, taking care not to enclose any feathers in the stitches, which should not be drawn too tight.

Arranging the Legs.—The legs can now be bent into their proper position. By studying the body of a plucked chicken a good idea of the arrangement of the bones, joints in the limbs and neck can be obtained, which it is quite essential to study if a natural position in a specimen is to result. The leg wires should be bent in all the joints naturally, being careful to preserve the balance of the bird, not leaving the legs too far back, which is a very common fault (Fig. B).

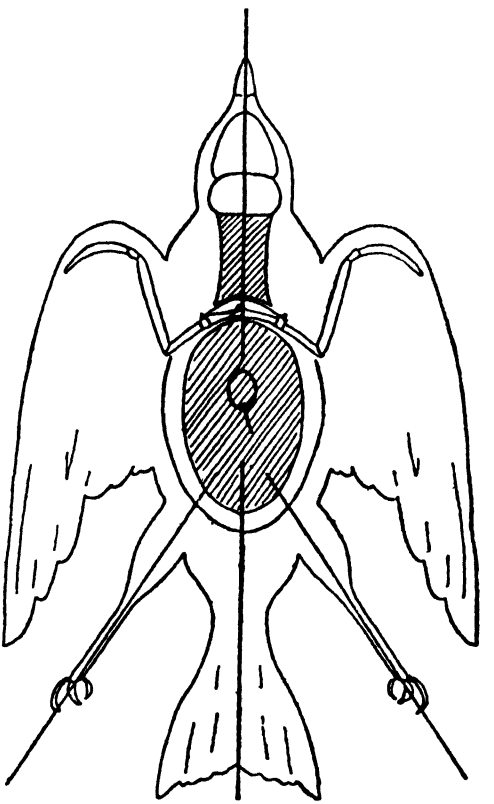


Fig. B.—Arrangement of Artificial Body in Bird Skin before sewing up. Wing Bones are tied; Leg and Tail Wires inserted.

Setting-up the Specimen.—The specimen is now ready to be set-up, either on a perch if a perching bird, or on a small square of thin board if a running bird. Bore two holes through the perch or board and pass the projecting leg wires through, bending the wires over at the back to keep the feet firmly secured.

The Head and Throat.—Attention can now be given to the head, neck, throat, and eyes. Bend the neck into the intended position you wish the head to take, pad out the throat evenly with small pieces of cotton wool inserted through the mouth with a wire skewer or the tweezers. Fill out the eye sockets and place a small piece of putty in the sockets to hold the artificial glass eyes in place, which may now be inserted, drawing the eyelids over them in a natural manner with the tweezers. Push a needle and thread through the nostrils and tie the thread underneath the beak to keep the mouth closed.

The Wings.—The wings are next taken in hand. If desired to remain closed, hold each wing separately in position and push a small hatpin or pointed length of wire through the outer joint of the wing straight into the body, leaving the ends of the wires projecting, which will be cut off at a later stage.

Attitude of Specimen.—If a flying attitude is intended with wings expanded, two lengths of wire must be used, finer than the leg wires, but

strong enough to support the weight of the wing and long enough to reach right across the expanded wing and through the body, one end of each wire to be sharpened. All wires sharpened should be filed to bayonet-edged points to facilitate piercing the various parts they are used for. Push one of the wires through the base of two or three of the outer quill feathers, then pass it along between the feathers under the wing the whole breadth of the wing, into and through the body far enough to clinch back; the clinched end will be hidden in the body feathers. Strips of card must be pinned on each side of the wings to keep the feathers neat and evenly in position.

Spreading the Tail.—To spread the tail, take two strips of thin card ½ in. wide, place one above the tail feathers and one beneath, pass a pin through the middle of the two strips to hold them on to the tail, push one or two more pins through the cards, which will brace the tail feathers in position. Straighten out and place in position any ruffled feathers about the body and head. Place the bird in the final attitude desired, and proceed to "bind up." Darning cotton is the best material for this purpose. Stick a small hatpin or a large ordinary pin in the back just above the tail and another between the shoulders. Loop one end of the cotton to one of the pins, and then carefully bind over the back across the wings, looping the cotton round the projecting wires from the wings, backwards and forwards across and round the body, straightening up loose or ruffled feathers as you proceed and binding them in place. Do not bind too tightly, or when dry ribs will show on the feathers (Fig. C).

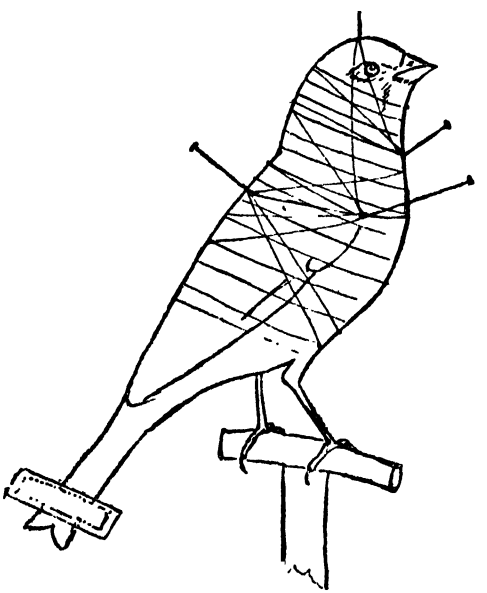


Fig. C.—Method of Binding Bird Specimen.

Useful Miscellaneous Data.—If the bird has long toes, the toes must be pinned out. The feet of ducks and other web-footed birds should be pinned out under pieces of card or cork to keep them flat.

When the bird is dry, which will be in from three to six weeks, according to size, it can be unbound and all projecting wires cut off close.

The colours of the legs and beak should be noticed as soon after death as possible and notes made for later reference, as in most cases the colours fade out in the drying and should be recoloured with tube oil colours when the specimen is quite dry.

Any blood can be removed from the feathers with a little warm salt and water applied with a pad of cotton wool, afterwards wiping the

feathers down with petrol. Sprinkle some dry plaster of Paris on the parts, leave to dry for a few hours and then shake and beat off with a fine wire or a stiff feather; the plaster will come away in cakes, leaving all clean underneath.

BOOKBINDING

The craft of bookbinding is not only particularly interesting, but is admirably adapted as a useful occupation for the winter evenings.

A Photograph Album.—As a beginning, something on the lines of the holiday photograph album, illustrated in Fig. A, forms a useful piece of work.

Punching the Sheets and Stubs.—Supposing the book to contain thirty-two pages, it will be necessary, in order to allow for the thickness of the photographs which will be pasted on the pages, to provide thirty-one narrow strips, as in Fig. B. These strips, known as stubs, should, in the present case, be about 1 in. wide, but they may be $\frac{3}{4}$ in. wide. Having provided the required number of sheets and strips, the next step is to punch them with holes in pairs, about $\frac{1}{2}$ in. to $\frac{3}{4}$ in. apart, equally spaced out, as shown. In order to ensure that all the holes register exactly, a strip of stiff paper should be used as a guide or templet. The holes can be punched with a leather workers' hand punch, or a hollow punch can be purchased quite inexpensively and used with a hammer on a block of hard wood covered with a piece of thick linoleum.

Preparing the Covers.—When the leaves and strips are ready, place them in order, as shown in Fig. C, and then prepare the back as in Fig. D. First measure the size of the sheets, and cut off two pieces of fairly stout strawboard to the exact width and $\frac{1}{4}$ in. longer. Next mark off on one side of each piece a strip equal to the width of the stubs and cut these strips off. Now place a heavy weight on the pile of sheets, as in Fig. C, and measure the thickness; this measurement gives the width of a strip of strawboard for the back. Place the five pieces of strawboard together as in Fig. D, the back piece B in the centre, with the two cut-off strips H each side, the distance between them being equal to the thickness of the board, and then place the two wide pieces next to them, but $\frac{1}{8}$ in. apart, as at C. A piece of material is now provided for covering the boards, large enough to project at least 1 in. all round as at A. Place the material, which can be bookbinders' cloth, leather, real or imitation, vegetable parchment, or ordinary brown or manila paper, flat on the table and mark pencil lines, showing the margin. Coat each piece of strawboard with paste or glue on one side as evenly as possible, and place the pieces in position, rub them down to ensure contact, and then turn the whole over and smooth down the material from the other side. The corners are now trimmed off, as shown, and the margin turned over and pasted down, as shown in Fig. D.

Cover Decoration.—The next stage is to arrange for any lettering or design it is desired to place on the cover.

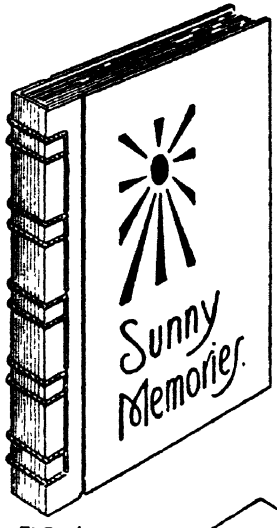


FIG. A.

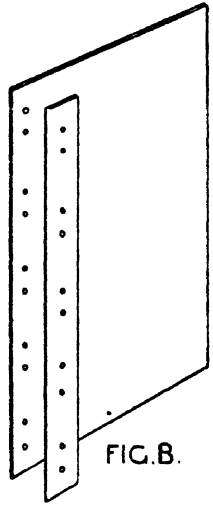


FIG. B.

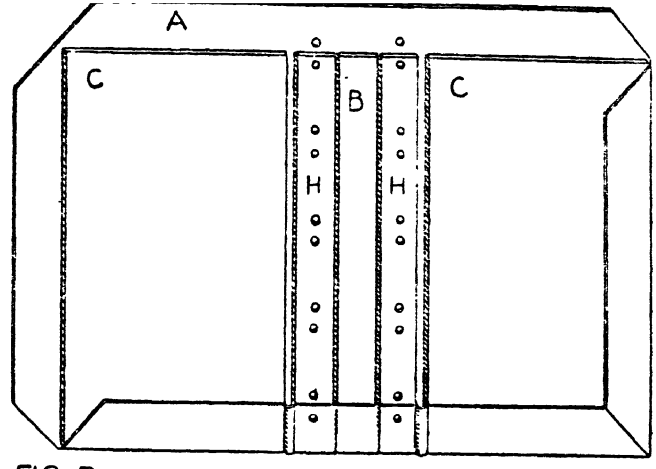


FIG. D.

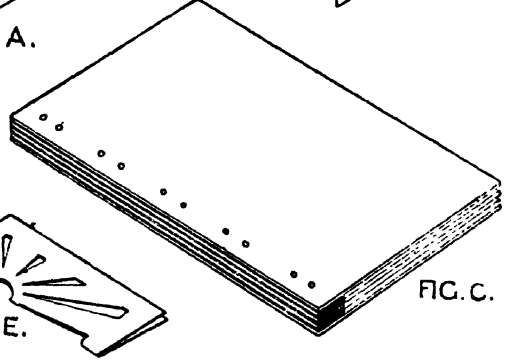


FIG. C.

FIG. E.

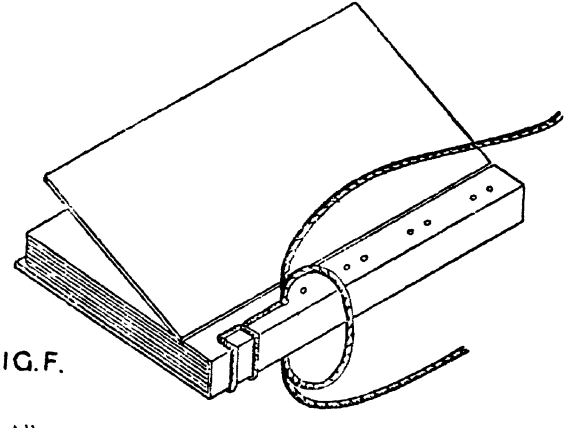


FIG. F.

Making a Photograph Album.

A method of cutting out a simple stencil ornament is shown in Fig. E —ordinary glazed notepaper forms an excellent stencil paper—and by folding the paper in two the design can be drawn and cut out quickly. The letters can be put in with a stencil or drawn with pen, brush, or indian ink.

Binding and Finishing.—The method of binding the work together is shown in Fig. F, the holes in the covering materials being previously punched through. The best material for binding is silk cord.

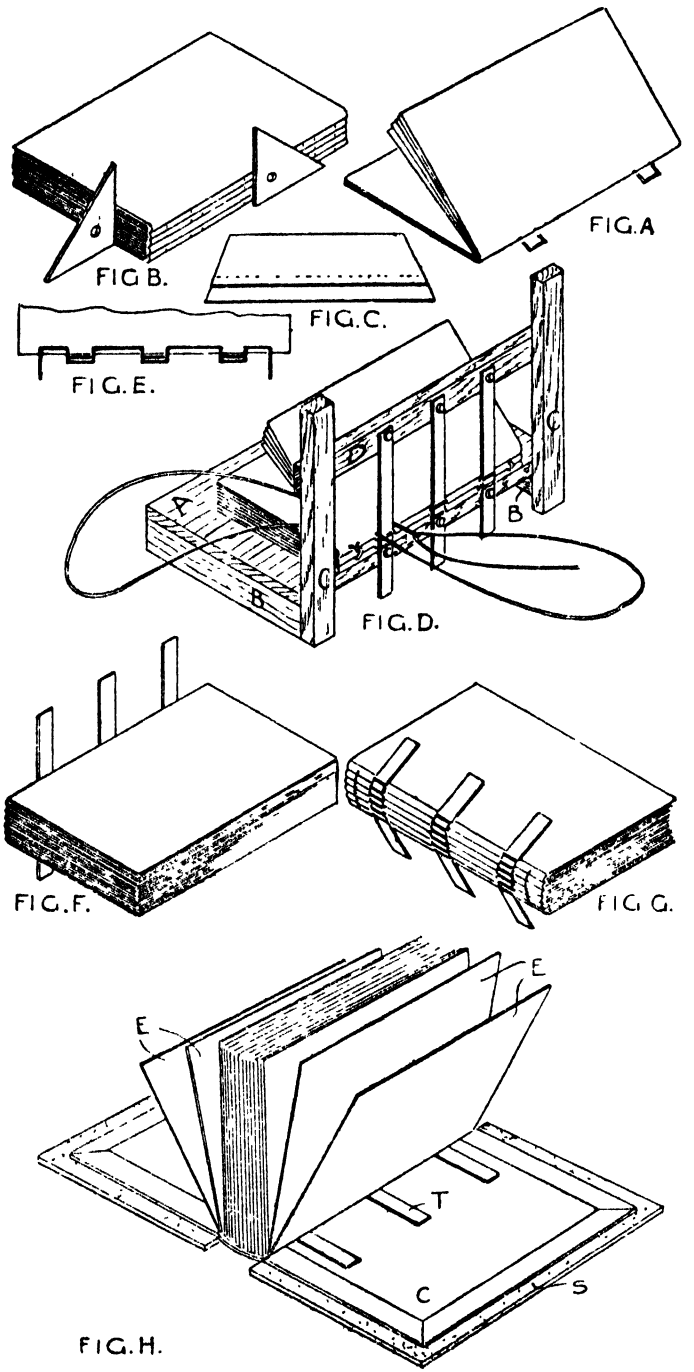
Place the sheets inside the cover, but provide two double sheets of either plain white, coloured, or figured paper to form end sheets.

Provide a long length of the cord and begin by threading both ends through the top hole, pulling the ends of the cord as tight as possible, as shown in Fig. F. Next take the cord through the next hole down the back, carry one end over the back and up through the hole again, the other length being taken through the next hole down. Bring the other cord down through the hole, as in Fig. F, and pull tight. The top cord is now carried down through the next hole and up through the next beyond, while the bottom cord is carried up the next hole, pulled tight, looped over the back and brought through the hole again. This method is continued until the last hole is reached, when the ends of the cord which pass through the hole are coated with seccotine and left to set. Another method is to finish off with a neat bow. The end sheets, next to the cover, are now pasted down neatly, and the book is placed under pressure for a few hours.

Magazines and Periodicals.—As magazines and other periodicals of similar character are trimmed clean on the edges and are generally fastened together with wire staples, they provide excellent material for the beginner who wishes to learn the craft of bookbinding. The first thing to do is to remove the staples and to separate the part into sections. In some cases the whole of the part is pinned from the sides; in others the sections are stapled, as in Fig. A, and the sections held together with glue.

The sections are separated and carefully piled one on top of the other in correct order as in Fig. B. If it is necessary to remove advertisement pages, and to do this means dividing some of the pages in the section, the half-sheet should have a strip of white paper pasted on the edge so that at least ½ in. can be folded over as shown in Fig. C.

The Sewing Frame.—The next step is to provide a sewing frame as shown in Fig. D; this can be made from odd pieces of wood, a convenient size being 12 in. by 8 in. by ½ in. or so for the bottom board A. Two 8 in. by 1½ in. by 1 in. strips should be screwed to it as indicated at B, then two uprights C, about 8 in. by 1¼ in. by ½ in., are nailed or screwed to the bottom pieces, and to complete the frame a strip D, 12 in. by 1¼ in. by ½ in., is screwed to the back of the uprights. The back of the sections is now marked with a pencil to give the position of the tapes which are



Magazine Binding with Sewing Frame and Tapes.

to be attached to the frame with drawing-pins. The tape should be from ½ in. to ¾ in. wide and the markings provide for two lines about ¾ in. from the ends and more or less equal spacings along the back as indicated. There are no exact rules to follow, but the proportions shown at Fig. B should be adhered to; the tape spacings marked on the back of the pile of sections should be measured off on the frame so that the tapes can be pinned on exactly.

Method of Sewing.—The method of sewing is shown at Fig. E; the thread enters the back and comes out again alongside the first tape. It passes over the tape, is carried inside the section and brought out again by the side of the next tape, and so on. The first section is now placed on the baseboard of the sewing frame, with the pencil marks coinciding with the tapes. A long length of linen thread is now threaded through a suitable needle, the latter being then pushed through the first pencil mark and brought out again close to the first tape. Pull the thread through,

leaving about 2 in. outside the first hole, and then push the needle inside again by the other side of the tape and then continue right along. When the last tape has been enclosed by the thread the needle is brought out to the front through the last mark. The next section is laid on top of the first, and to make sure that it is quite level with it, place a set-square on the sides. Now push the needle through the last mark on the new section, pull the thread tight and then bring the needle out on the far side of the last tape, pass in front of it, inside again, and continue right along to the first mark. The third section is now placed on top, the needle pushed through the first mark, but before the loop is pulled up tight the spare end from the beginning of the first section is passed through it and wrapped round it twice. The sewing is continued in this way until the whole of the sections have been sewn together, but it should be noted that each section as it is placed on the top below should be trued up with those below. The thread will have to be renewed, the knot being tied securely between the old and the new length. The end thread of all should be tied to the last connecting loop on the end line of sewing.

Fixing the Covers.—The sewn sections are now removed from the frame by taking out the drawing-pins which secure the tape, and should be placed flat, as at Fig. F, and the ends of the tapes cut to the same length each side. The next thing is to cover the book with a board and place a heavy weight on top so that the ends of the tapes can be pulled tight. The inside should now be pressed outwards so as to give a rounded effect as shown at Fig. G, and then the book can be placed on a prepared cover made of strawboard covered with suitable material, as in the case of the photograph album.

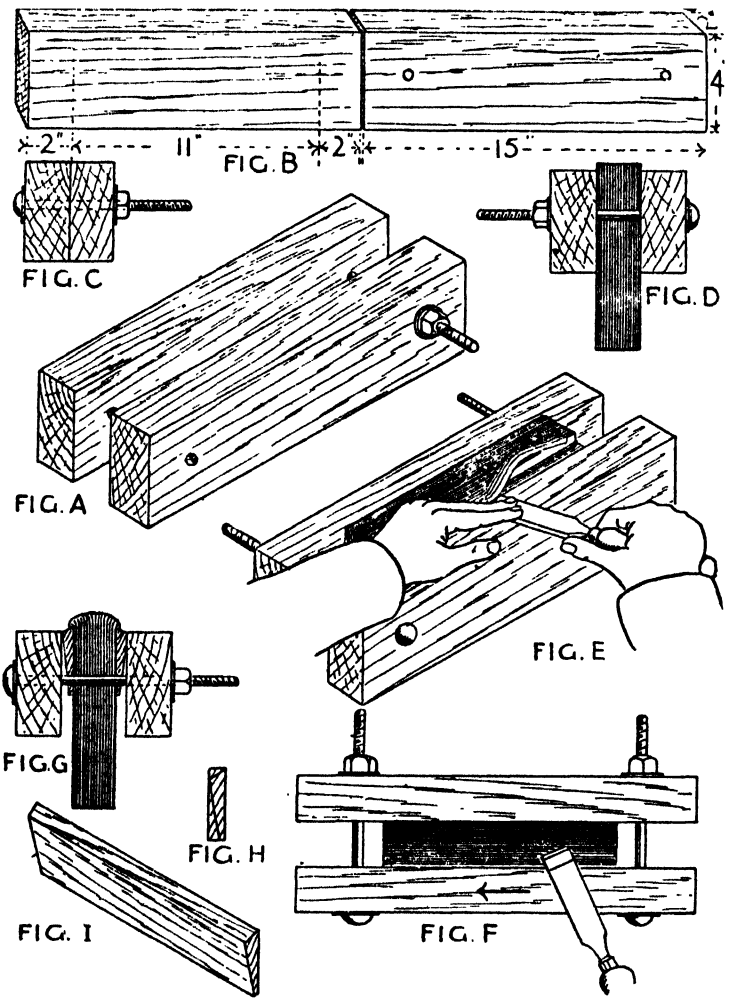
The tapes T are pasted down on the cover C, but, to allow the back to form a neat round, the cover should be supported on two thick boards, as shown at S, Fig. H. The tapes are covered by pasting in two end papers as indicated by the sheets marked E.

A Bookbinding Press.—A useful press for trimming the edges of sewn books is illustrated at Fig. A. It is made of two 15 in. lengths of 4 in. by 2 in. material, with two $\frac{3}{8}$ in. or $\frac{1}{2}$ in. diameter bolts, fitted with washers and nuts. The two holes, marked out as shown at Fig. B, should be a nice fit for the bolts. As it is not likely that anything thicker than 2 in. is likely to be placed in the press, it will do if the bolts are 7 in. long, but it should be noted that when the bolts are tightened up, as shown in Fig. C, the inner surfaces should fit quite close.

Using the Press for Trimming.—In using the press for holding the sewn book, care should be taken to work to lines drawn quite square and true on the outside leaf, and to keep the leaves quite level, as shown in Fig. D; the amount of the projection above the top edges of the press depends on the amount to be cut off; as a rule it should not exceed $\frac{1}{8}$ in.

The next thing is to provide a 1 in. or $\frac{1}{4}$ in. firmer chisel; this should have a long bevel, and be as sharp as it is possible to get it. As paper

cutting will take off the keen edge of the chisel very quickly, an oilstone should be handy, so that the edge can be sharpened as often as required. The chisel handle is held firmly in the right hand, as shown in Fig. E, and the first two fingers of the left hand placed on the blade so as to press it closely to the top surface of the press. Hold the chisel at a slope away from the direction of the cut, as shown in Fig. F, and press the edge into the paper, drawing it firmly from one end to the other



Showing a Bookbinding Press and the Methods of Using it.

Rounding in the Press.—The method of using the press for rounding the back of the book is shown at Fig. G, two wedge-shaped pieces of wood, known as backing-boards, being placed each side of the back as shown. These pieces should be prepared from 11 in. by 3 in. by ½ in. wood, marked off on the end, as shown at Fig. H, and then planed down, as shown at Fig. I. With a press such as this, and a sewing frame, almost any style of book can be bound, and the whole of the necessary appliances need not cost more than a few shillings. The process of rounding is really preliminary to backing, when the book is in the press. The trimmed book, that is the bound book, after the edges have been cut smooth and true, is placed on the table, with the fore-edge, that is the front, in front of the binder; the top of the book is known as the top, and the bottom the tail. The fingers are now placed on the side

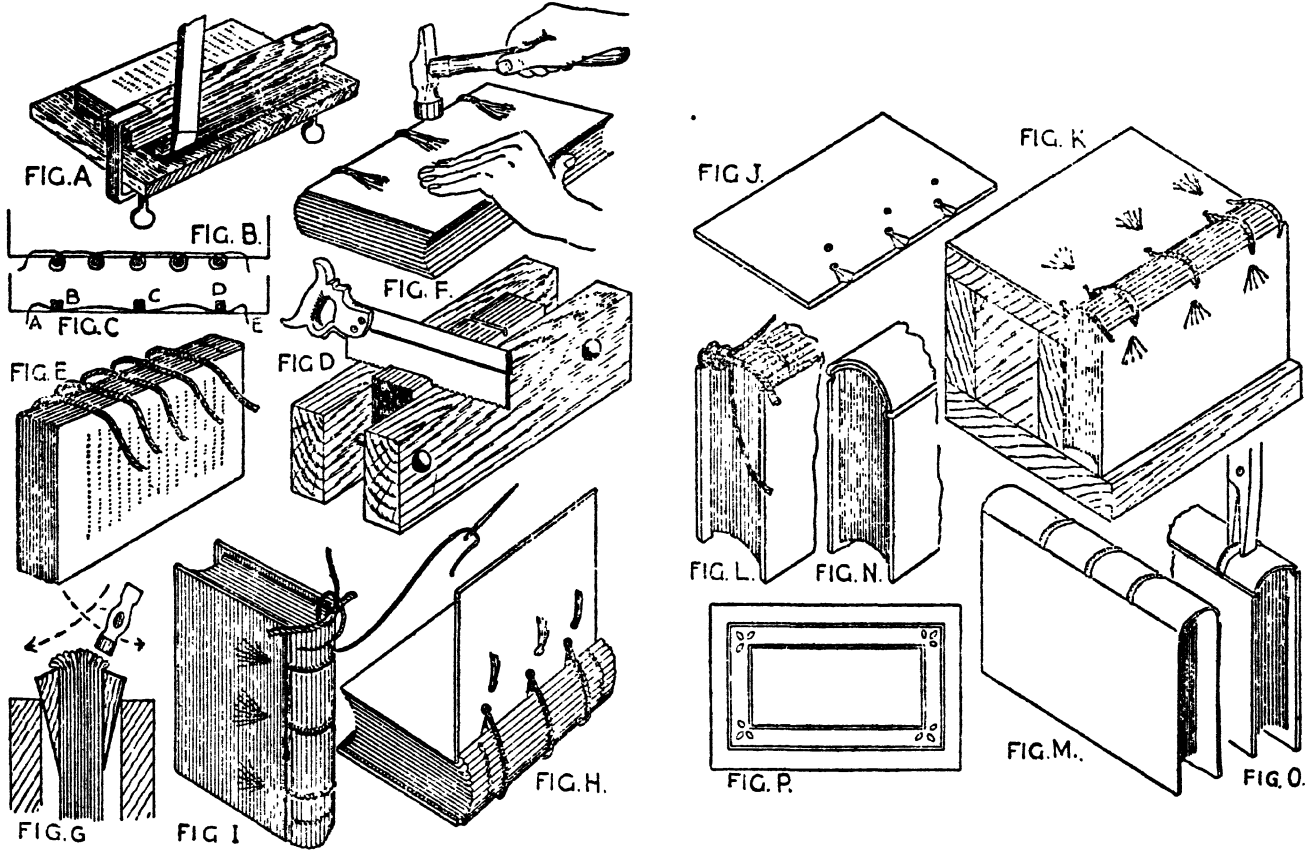
of the book with the thumbs on the fore-edge, and the fingers are drawn towards the thumbs so that the back is drawn forwards. The book is turned over carefully and the process repeated; this is followed by a few taps with a hammer in order to obtain an even round. The two backing-boards are now placed in position each side, the press opened out and the book lowered in so that the corners of the boards are flush with the press as shown. The back is now gently struck with the back of the hammer, holding it slanting, beating the sections well over towards the backing-boards. Begin at the centre of the back and do not hit too hard, or the dent made by the hammer will show after the back has been covered. The back is finished by bringing the sections well over the boards so that a good and solid groove may be made. Each side should be treated in exactly the same way, care being taken that the hammering is not more thoroughly done on one side than the other. The book, when opened after backing, should be entirely without wrinkles, and should open evenly and show no tendency to resume its original shape.

Cord-sewn Books.—An alternative press is illustrated at Fig. A, suitable for books about 1 in. or so in thickness. Books with rounded corners can be trimmed up by this method, but the top piece of wood should be cut to the exact length of the page, and have rounded corners, so as to provide a guide for the chisel cuts.

There are two methods of cord sewing : the better of the two has the cords on the outside, as shown at Fig. B, the other has the cords let in grooves cut in the back of the book, as shown at Fig. C. In dealing with a cord-sewn book where the cords are let into grooves, the back of the sections is marked off for three or more cords, which are tied to the sewing frame, and then the book is placed in the press, as shown at Fig. D, so that cuts can be made on the marks. The sections are now taken one by one, as in tape-sewn binding, but the sewing thread is carried from one end of the section to the other, in front of the cords, as indicated at Fig. C. It will be seen that this is a much quicker method of sewing, but it is not so strong as the outside tape or cord methods. The thread enters the section at A, it passes the front of the cord at B, goes along to C, and then to D, finally coming out at E, when it is ready to follow the same order reversed in the section above. When the cord is outside, the sewing frame is fitted with cords, and the method of sewing is similar to that of tape sewing, except that the thread, usually of silk, is looped round the cord, as shown at Fig. B; the finished work being shown at Fig. E.

The method of rounding the back is shown at Fig. F, and although it is quite a simple process, considerable care is required to obtain an even round.

The book is placed flat on a table, the fingers of the left hand are placed on top, and the thumb on the fore-edge. The centre of the fore-edge is pressed inwards, while the fingers draw the upper portion of the leaves forward, the hammer being used while this is being done to



Illustrating Methods Used in Binding Cord-sewn Books.

ensure that the back remains round. Both sides are treated in the same way, and then the book is placed between the sides of the press, as shown at Fig. G, so that the final shaping can be done. It is necessary to use wedges in the press so as to allow of the thick portion of the back to be worked over as indicated. It is understood that prior to the rounding, the back, immediately after the sewing is finished, has been trimmed and then coated with glue, and that this coating is quite dry. It is quite impossible to round the back satisfactorily unless it has been made firm with glue.

Fitting the Cover Boards.—The next process is to fit on the boards, as shown at Fig. H. It will be seen that the cords are passed through two holes bored in the cover, and the ends of the cords are unravelled, spread out and then glued down to the surface, as at Fig. I.

The cover boards are prepared, as shown at Fig. J; the notches allow for the thickness of the cords. The holes should be bored with a bradawl, and the burr removed with a sharp knife. The cords are drawn through the holes to the outside, then carefully unravelled, spread out separately and glued down to the surface, care being taken that the edge of the board is close up to the projecting corner of the rounded back. The glue is allowed to dry and then the cover is placed flat on a board, as at Fig. K, the book supported, and then the separated fibres of the cord hammered into the cover board to leave a flat surface.

Headbands.—In books of this style it is usual to fit headbands as indicated at Fig. I; sometimes the headband is formed with a strip of vellum instead of the cord, as shown. The method of sewing on the headband is shown at Fig. I; the thread, usually of silk, is carried down to the first line of sewing, and the space between the centre of the sections is wrapped round with looped thread, as shown at Fig. L. The ends of the headband cords are threaded through the top of the cover boards, as shown at Fig. I, and hammered flat.

Finishing Processes.—In covering the boards it is possible to use linen or cloth, but the best books are covered with leather. In the first place the piece of leather is cut to allow for overlapping on the inside of the boards, also the hollows for the bands are marked and pressed out with a blunt tool from the back of the skin. The leather is now placed on the book, as at Fig. M, and pasted down, the inside mitres are cut in the ordinary way, and the top and bottom of the back portion cut, folded over, and pasted down inside. The book is now placed under pressure, so that the whole of the book below the rounded back is covered. The leather is worked in along the back edges of the boards to give a neat finish, as at Fig. N; this portion being usually tied with string to keep it in position until the paste is dry.

Lettering.—Lettering on leather- and cloth-bound books is done with small steel stamps, which are heated and pressed into the material. Ornamentation in the form of lines is done with a heated steel wheel,

and patterns are formed in the same way as lettering by means of shaped stamps or punches pressed into the surface. In cord-bound books the bands on the back are finished by pressing them together with flat pliers, as shown at Fig. O, and the ornamentation on the covers done with the covers placed flat as at Fig. K.

A suggestion is given at Fig. P for a simple decoration that can be done with a simple punch made from a piece of brass rod for the pattern and a knitting needle drawn along the leather and pressed well into the surface for the lines.

The edges of bound books can be coloured in several ways; one of the simplest methods is to use a coloured ink, dip an old toothbrush into it, shake off the superfluous ink, and then draw an old comb through the brush so that fine spots of the ink will fly on to the edges. Unless the cutting has been very clean, the surface should be prepared with glass-paper : the cover should be protected if the edges are coloured after attaching the cover boards. Plain colours can be applied with a sponge but care should be taken to keep the pages together as tightly as possible, and to squeeze the ink from the sponge to leave it damp and not wet.

BOOT AND SHOE REPAIRING

Tools.—The tools necessary for ordinary home repairs are: one repairing last, comprising three toe lasts of different sizes, and two heels; one hammer, double faced; one pair cutting nippers; one pair shoe nippers; one knife; one rivet driver, or an old file will do; one hacking knife; one rasp; one steel scraper; one heel glazing iron; two forepart irons, large and small; one stabbing awl; one sewing awl; hemp; wax; bristles; heel ball, black or brown; burnishing ink; brass rivets; iron rivets; sand-paper; emery cloth. The emery cloth is for the knife strop. A square piece of wood, such as quartering, will do. Paste strips of emery cloth on three sides, and on the fourth side tack a piece of leather similar to a razor strop. Use the emery cloth so that there are always three grades of wear, rough, medium, and smooth. Hints on sharpening the knife are given later. The leather required will be dealt with as we proceed.

With all the necessary tools to hand, the home boot repairer can now make a start. A word of advice at this point—Don't start pulling a boot to pieces until you have some idea of how it is made. In fact, a boot repairer must know how the boot or shoe is made, otherwise accidents will occur. Boots and shoes are made in several ways, the principal being: hand-sewn, machine-welted, and machine-sewn. Riveted boots are sometimes met with in children's boots.

Hand-sewn and Machine-welted are made on the same principle—that is, the upper portion is lasted over the insole, which is attached to a wooden last, and a narrow strip of leather, called the welt, is sewn in with a horizontal seam, one line of stitches showing on the insole and one on the inner edge of welt. The sole is attached with a stitching

seam, the stitches passing through the centre of welt, and into a channel cut into the bottom of sole, near its edge. This explanation will show that a boot or shoe made on this principle should not have the sole pulled off with a pair of nippers. This mistake very often happens to a beginner, with the result that the boot is ruined.

Machine-sewn are made on a different principle altogether In this case the upper portion is lasted over the insole (which is attached to an iron-plated last), and secured with tacks all round, the points of which clinch on the iron plate. *There is no welt in this type of boot.* The sole is attached by a vertical thread seam, by a machine called the "Blake." The needle or hook of this machine enters the channel in the sole, and carries the thread straight down through to the insole, making a line of stitches in the channel of sole, and one on the insole, inside of the boot. To ascertain whether a boot is made on this principle, lift up the sock inside, and see if any stitches are there.

Riveted are made on similar lines to machine-sewn, but instead of a thread seam, the soles are attached with rivets.

The most common are the machine-sewn, so they will be dealt with first.

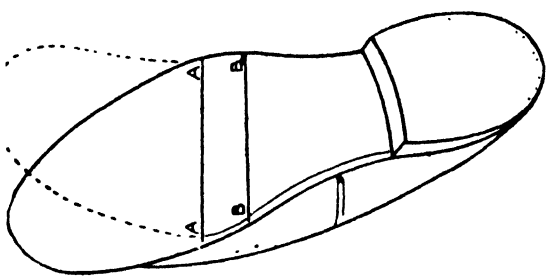


Fig. A.—Shows the Soles Cut Away from Boot. AA.- The joint positions BB.—One inch below.

Stripping Old Sole (Machine-sewn).—Bearing in mind that this type of boot has a vertical thread seam, to remove the old sole the stitches must be cut just under the sole. To do this, insert the point of knife between the sole and middle sole (if any) at the toe, and cut one or two stitches. Take hold of the sole with a pair of shoe nippers and gently pull the sole away, and cut through the stitches as they show. At intervals along the sides of sole small sprigs will be found. These should be removed. Continue cutting the stitches until 1 inch beyond the joints. These joints can be located by taking the two points, one on either side of the boot, where the sole is widest. It will be found that the inside joint is higher up the boot than the outside. If these joint positions are worked to, the boot will be comfortable when repaired. Fig. A shows the sole cut away from boot; AA the joint positions. At this point make a pencil mark 1 in. below the joints, as BB, Fig. A. Now cut the old sole across at joints AA.

Preparing the New Sole.—The leather used for the new sole should be selected to suit the job in hand. "Bends," a trade name given to a certain kind of leather, are mostly used for repairs. Good English "bends" can be obtained inexpensively, or ranges cut from them at slightly higher prices. The stouter parts are used for men's and boys'

work, the lighter parts for women's work. The leather in its dry state is not workable, so several processes must be gone through to get it in a proper state. Wetting is the first process. Place the leather in a bowl of clean, cold water, and let it stand until wet through. Twenty minutes is required for a good leather. Mellowing is the next process. Take the leather from the water and stand it up to drain the surplus water off. If the leather is wanted quickly, wrap it up in its wet state in paper, and let stand for a time. Leather is best mellowed by wetting it overnight, and wrapping it up. In the morning it will be easy to work and cut. The next process is to beat it. Place the leather grain side (that is, the wearing side) down to a flat iron, and gently beat all over the flesh side, with the large face of the hammer. This sets the fibres and prevents spreading in wear. The above processes are most important in boot repairing for good results.

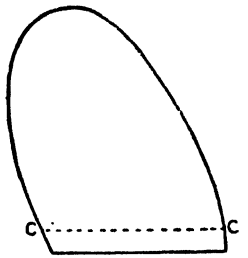


Fig. B.—Showing Mark CC for Reducing Sole.

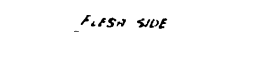


Fig. C.—Showing Sectional View of Shoe when Cut.

Grafting New Sole to Old.—Grafting means the joining of the new and old sole at the waist portion of boot. This join should be done in such a way that when finished the two should be as one in thickness. Taking the line BB, Fig. A, fit the new sole to it, seeing that it covers all the space left by the old sole. Cut the new sole to coincide with the line BB, Fig. A. Now place the new sole grain side down to a cutting board (a piece of wood 6 in. wide and 12 in. long), and mark off 1 in. from the edge of sole at the bottom on the flesh side, as in Fig. B, CC. From this line the sole is reduced to half its thickness, towards the edge, Fig. C. The old sole is now reduced from the line BB towards the cut edge AA, Fig. A. By making a small groove with a rasp across the old sole at BB, the knife will go through more easily, also it will make a recess for the new sole to fit in (Fig. E). The edge AA should be cut to a feather edge. Place the new sole in position, and tack it with two rivets, one on either side of the graft. Force the sole towards the toe of boot, and place one rivet in the centre of toe. The sole fastened on is shown in Fig. D.

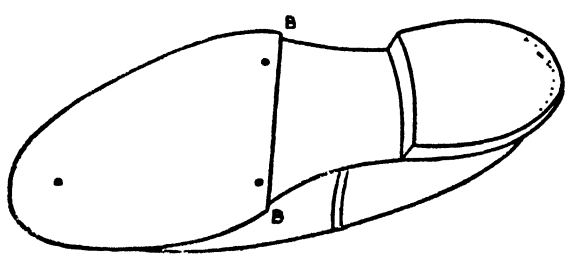


Fig. D.—New Sole Fastened to Boot and Trimmed Up.



Fig. E.—Section of Old Sole when ready to Receive New Sole.

Trimming the Sole.—As trimming depends upon a keen sharp knife, a word on sharpening a knife is necessary. Hold the knife strop in left

hand and the knife in the right, in a similar manner as for stropping a razor. Hold the knife flat to the strop, the cutting edge away from strop handle, and draw the knife along the emery. Turn the knife over on its back edge, lay the other side flat on emery, and push away. Repeat these two motions until the knife is sharp. On no account hold the knife at an angle with strop. Trim round sole, leaving $\frac{1}{4}$ in. all round over the shape of the middle sole. The sole is now ready for either machine-sewing or riveting. If the sole is to be machine-sewn, make a mark $\frac{1}{4}$ in. from the edge of sole Hold the knife like a pen between the fingers of right hand at an angle of 45°. Insert the point of knife in the sole, starting on the line on the right-hand side of sole, toe towards you. Draw the knife towards the toe, cutting to the depth of one-third the substance of sole, keeping strictly to the mark all round. This channel is opened with a channel opener (a screwdriver is good enough), and the lip of channel turned back on to the sole. Figs. F and G show how the channel is cut and opened. The boots can be taken to any boot-repairing factory where "Blake" sewing is done, and for a small sum will be sewn round. When sewn the channel is closed down again with a little rubber solution.

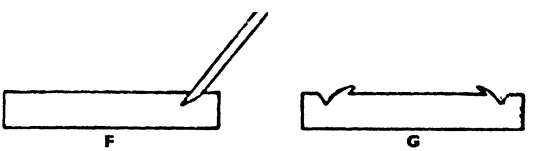


Fig. F.—Shows the Angle and Depth of Knife when Cutting Channel.

Fig. G — Shows how the Channel is opened and Turned Back on to the Sole.

If, instead of sewing, the sole is to be riveted, mark round sole a line $\frac{1}{2}$ in. from the edge, and at a distance of $\frac{1}{2}$ in. apart make holes with a bradawl, the holes pointing in toward the centre of the sole. Judge the thickness of the sole for the rivets, and use $\frac{5}{8}$ in., $\frac{1}{2}$ in., or $\frac{3}{8}$ in. accordingly. The rivets should be just long enough, so that the points only clinch on the iron foot. Having rivets too long will spoil the insole of boot. Use brass rivets whenever possible, and drive them in with the driving file. When the sole is riveted set down with the hammer.

Resoling Hand-sewn and Machine-welted Boots. Stripping the Old Sole.—Great care must be taken to remove the old soles from hand-sewn and machine-welted boots. Take the boot with the toe towards you, and insert the point of the knife between the welt and sole at the right-hand joint, taking care *not to cut through the welt.* Draw the knife steadily towards the toe, severing the stitches that hold the sole to welt. Mark off the positions as AA and BB, Fig. A, and cut old sole across at AA. Prepare, fix, trim round, and cut the channel in sole, as shown for machine-sewn. The process of hand-sewing the sole will not be difficult if the following instructions are worked to.

Making the Thread.—The materials required are hemp, wax, and bristles. Open the ball of hemp from the inside, and place it in a box, to the right hand. Hold the end of hemp in left hand, and across the right knee. Lay the palm of right hand over the hemp, and roll it gently away from you. This will cause the hemp to unwind. Press down on

hemp with right hand, and give a pull with left, and the hemp will break in a long tapering end. Pull out a length of hemp about a yard long, and break off again with a tapering end. For sewing a man's boots eight of these strands are required, for women's work five will do. *The way the thread is made up.*—First the one-yard length is cast off, as above. The second length is cast off ½ in. longer at each end, and so on, each length being ½ in. longer at each end, until the required number is obtained. These are now held firmly together, in the centre, by the left hand, the wax held in the right hand, and drawn down each side of the thread towards the ends, until it is covered with wax. Put the centre of thread round a hook, and hold both ends in the left hand. Place one end on the right knee, and roll it away from you with the palm of right hand. At each twist release it on the left hand. Roll until the thread is twisted to the hook, then reverse the ends, and treat the other one the same. The thread is now ready for the bristles, which act in the same way as needles. Take one bristle, and wax it from a point one-third from the good end, towards the split end. Hold it at the point one-third from end between the thumb and first finger of the left hand, the good end pointing to the right. Bring the tapering end of thread up with the right hand, until it touches the bristle. Roll the bristle with point of thread away from you, and the thread will start winding along the bristle. When the extreme end of thread is secure to bristle, hold firmly between the thumb and finger of left hand, and twist the good end of bristle away from you with the right hand, at the same time giving a gentle pull to the right. In this manner the end of thread will wind round the bristle, spirally, towards the split end. Make a hole in the thread at this point, pass the good end of bristle through, and pull up, so fastening the bristle so that it cannot come undone. The hole in thread is made with a stabbing awl. Put a bristle on the other end of thread in the same way.

Sewing Sole.—Place the boot on left knee, toe towards you, the welt to right. Secure it with a strap, which passes under the foot. Take the sewing awl in right hand, and pierce a hole, from the centre of the welt, through to the channel in sole. Start sewing from the joint towards the toe. Make another hole about ⅛ in. away from first, and put the ends of thread through it in opposite directions. Pull up tightly, so forming a stitch. Continue the sewing round sole to the other side. The channel is closed in the same way as for machine-sewn.

Repairing Worn Heels.—When heels are worn badly some method must be adopted to raise them up again to their original height. There are two ways of doing this, either cutting out or wedging. Cutting out is recommended as best. Remove the worn piece at the top. Where the under pieces are worn it will be seen that they thin off towards the back. At these points of wear they can be cut out, in the form of steps, and other pieces of leather inserted, as shown in Fig. H. The pieces must be put in and secured, one at a time, starting from the bottom. The top piece of the heel should be cut from a good piece of bend leather. Prepare it, by

wetting, etc., and fasten on with two rivets. Trim round to shape of heel, leaving $\frac{1}{8}$ in. all round. Mark $\frac{1}{4}$ in. from edge, and rivet round with $\frac{5}{8}$ in. iron rivets, putting them closely together where the wear is greatest.

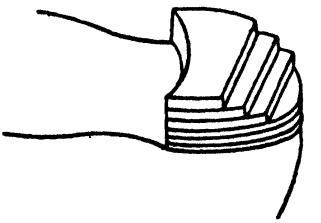


Fig. H.—Heel Cut Out ready for Rebuilding.

Finishing Repairs.—A good many home repairers consider the finishing of a repair unnecessary. This is a great mistake, as finishing makes the repair look better, and helps keep the leather waterproof.

The first process of finishing is rasping. Take the rasp and hold it rough side down, in right hand, the thumb on top and the finger tips underneath, the flat side for heels, and the half-round side for soles. Work round the boot from right to left, forcing the rasp into the leather, until the edge is square. Follow on with scraper, after which sand-paper well, then ink all round. When the ink is nearly dry, warm the heel glazing iron, and work round the heel, putting firm pressure on the iron. When the ink is burnished, put a little heelball round, make the iron hot, and melt the heelball, which will spread evenly and fill up all cracks. Do the same with the soles, using the forepart iron to fit. Rub the heelball smooth with a piece of cloth. Warm a fudge wheel, and run it round on top of welt. The bottoms of repairs can be finished by rubbing soap or tallow into them with a piece of flannel. Brown boots are finished in the same way, only using brown ink and brown heelball.

Patches.—The best way to patch a boot is to stick it on with leather cement. Select a piece of upper leather, the same kind as the boot to be patched, and cut it to cover the hole in boot. Thin the edges all round, and place in position on boot. Take a piece of white chalk, and chalk over the patch and on to the boot. When the patch is removed the chalk outline will act as a guide for roughing up. With the point of a knife scrape the leather that is inside the chalk line, until the face of the old leather is roughed up. No smooth parts should be left exposed. There are two kinds of leather cement; one has a very unpleasant smell (Ball & Sons), but is very good for patching. The other (Warmans) is not so smelly. If the first kind is used, put it on out-of-doors. The patch and boot are now ready for the cement. It can be put on with a stick, but not with the fingers. When putting on the cement see that it covers the whole of the patch on the flesh side, also the portion of the boot that has been roughed up. Lay both boot and patch on one side to dry. When dry, hold the two cemented

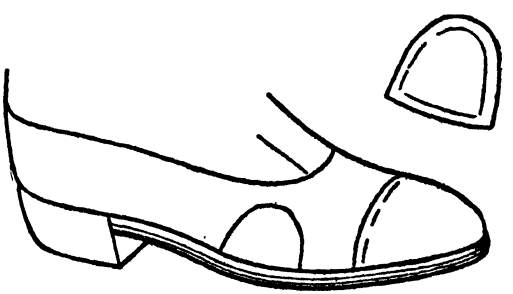


Fig. I.—Boot and Patch ready for the Cement.

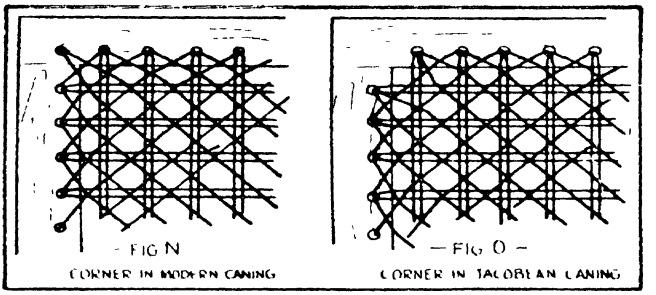
surfaces to a gentle heat, and when tacky put the patch in its position and press down firmly all over. To finish the patch, warm the glazing iron and run a little heelball round the edge of patch, afterwards placing a cold iron, such as a hammer head, on to set it. If the patch is to be sewn down to the sole press it well into the welt, make a thread and proceed as for sewing soles. Fig. I shows patch and boot ready for the cement.

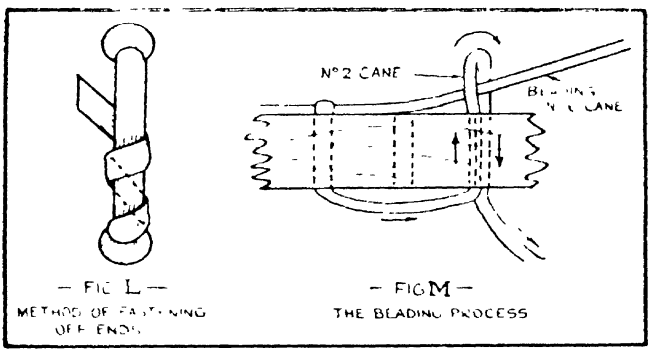
Fixing Rubber Soles.—The easiest rubber soles to fix are those similar to "Stick a Sole." These rubber soles should be put on the boots before the leather soles are worn too far. The method of fixing is to place the rubber sole in position over the leather sole, and mark all round with a fine awl. This will give the exact position for the rubber sole when fixed. Rough up inside the mark with a rasp, taking care to get all dirt and grit from the leather. Give the leather sole a good coating of special solution or rubber cement as Phillips's, and let it get dry. This will take about twenty minutes. When dry hammer all over the sole, forcing the solution down. Now give another coating of solution to the leather sole, and also one to the rubber sole. Let them both dry, or leave them for twenty minutes. After this time, press the two soles together, starting at the joints and forcing towards the toe, to get rid of all air bubbles. Hammer down, all over rubber sole, and see that the edges of rubber sole are stuck to the leather sole. Crêpe rubber can be used in the same way. A good solution to use for crêpe rubber is Diamine Leather crêpe cement. When repairing with crêpe rubber see that all dirt and old solution, etc., is removed from the old surface before attempting to put on the new. Crêpe rubber can be obtained on order from the local leather merchant.

CANE SEATING AND PANELLING

Most readers will be acquainted with the style of furniture known as Jacobean, with its familiar twisted members, cane panels in backs of chairs and often caned seats as well. From this period—round about 1660 onwards—caning has retained its humble place in a great industry, so that to-day there is hardly a home without at least a cane-seated bedroom chair. The caning itself is practically unchanged, but there are two details not found in modern caning—and often not in "period" caning either—which the writer, though not a furniture expert, believes are characteristically Jacobean. The first is the absence of a corner hole which necessitates a slightly different but equally simple arrangement of the diagonals at the corners; Figs. N and O (Plate facing page 118) illustrate this point. The second characteristic is the wider mesh and coarser cane employed.

To be historically accurate, therefore, the corner holes should be omitted, the other holes placed farther apart—say, $\frac{5}{8}$ in. from centre to centre—and Nos. 3 and 4 cane used instead of Nos. 2 and 3. In all other respects the caning is as described below.





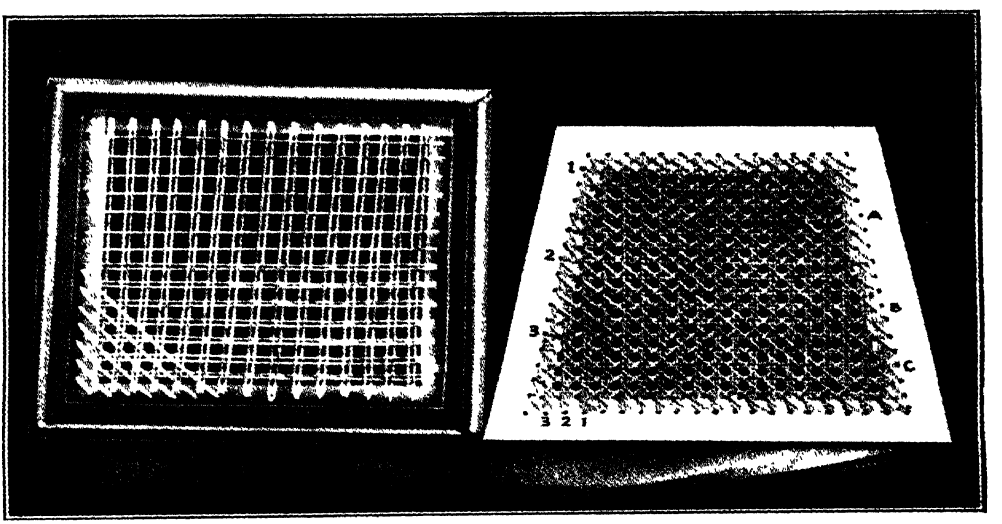


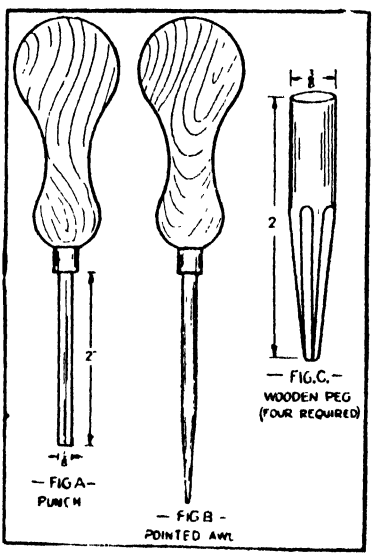
Fig. P. The Square Type of Seat. Fig. Q Another Shape of Seat

CANE SEATING.

Regarding the staining of caned areas, this is done with ordinary wood stain applied with a brush after the caning is completed; both cane and woodwork can be stained at the same time if desired.

The Cane.—Chair cane is numbered according to width from No. 1 to No. 6. Ordinary caning employs No. 2 for the vertical and horizontal rows, No. 3 for the diagonals, and No. 6 for beading.

The Tools.—For re-caning, that is to say, when old caning has to be removed, a punch or clearer (Fig. A), which can be made from a stout bradawl, is required. Fig. B shows the pointed awl used in the later stages of the work to clear a passage through the holes. Four wooden pegs (Fig. C) to hold ends of cane temporarily in the early stages will be needed, and a hammer and knife or scissors complete the equipment.



Cane-seating Tools.

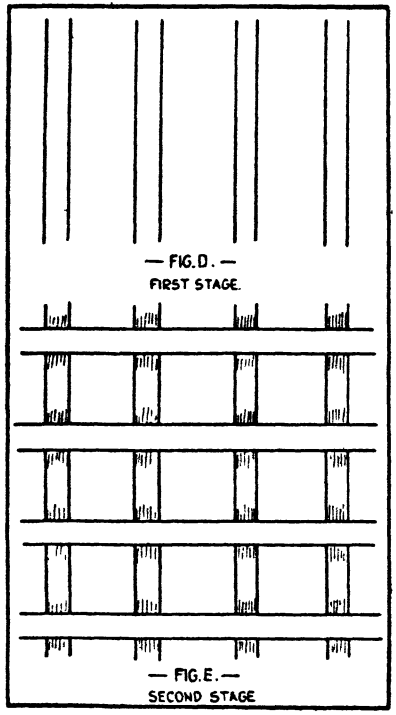
How the Caning is Done.—First stage (Fig. D). A single set of strands running from back to front or, in the case of a panel, from top to bottom. Pass the end of a length of cane up through the centre hole in front, carry it across to back and down the corresponding hole there, leaving about 2 in. underneath, and push a peg into the hole. Return to front, draw the cane fairly taut from underneath, and insert a second peg in this hole. Now pass the cane up through adjoining hole, across to back and down the corresponding hole there, and peg it with the peg taken from front hole. Continue this process backwards and forwards till hole next to corner hole at back is reached. If the seat is shaped like Fig. Q, short strands, marked 1, 2, and 3, must be added. The other half of seat is filled in exactly the same way, and ends are fastened off underneath, as shown in Fig. L.

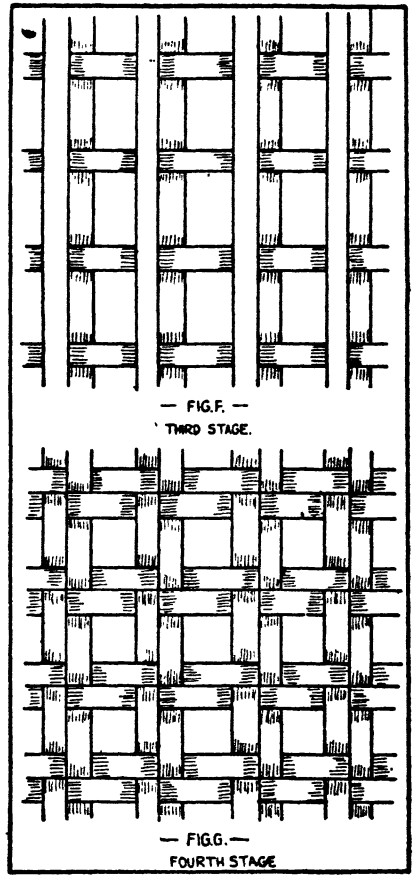
The second stage (Fig. E) consists of a single set running from side to side; this set is worked in the same manner as stage one.

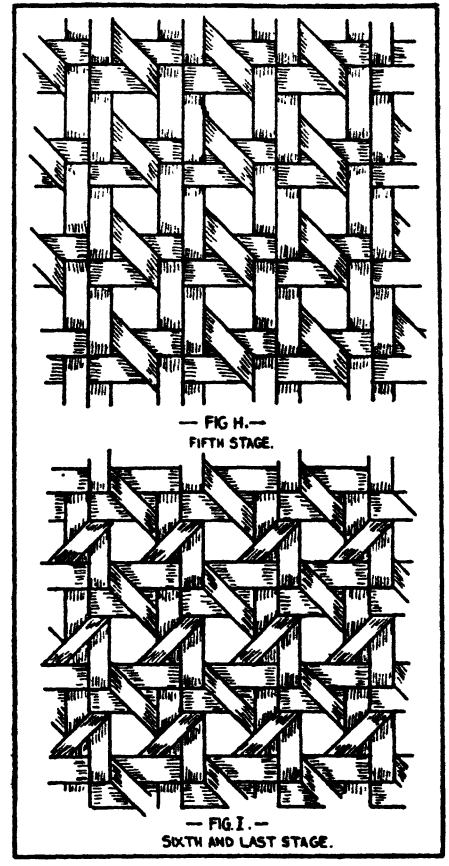
The third stage (Fig. F and top half of Fig. P) is simply a repetition of stage one, the strands resting on top of the "side to sides."

In the fourth stage (Fig. G, and the lower of Fig. P), the cane is woven across, one hand being above the seat and the other beneath, and the end of cane being passed from hand to hand.

The fifth stage, or first diagonals, shown in Fig. H and at bottom left corner of Fig. P, have also to be woven in. The main thing is to keep each diagonal as straight as possible at the ends, and to effect this a hole can be missed or two ends put into the same hole when necessary. See Figs. J and K, and Fig. Q, at A, B, and C.



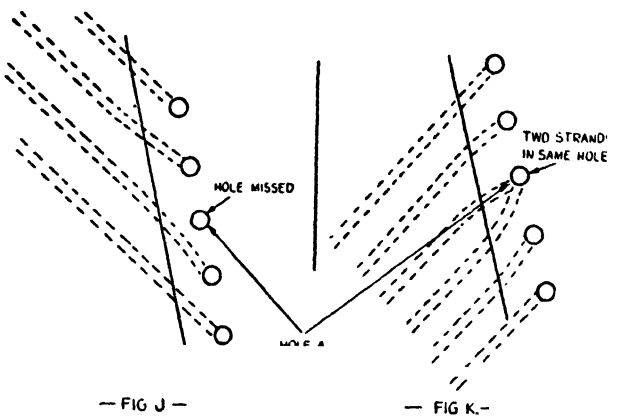




Showing the Various Stages in Cane Seating.

The sixth stage (Fig. I) is the second set of diagonals which completes the pattern. Note that in this stage the strands pass under where those of the previous set passed over, and vice versa.

After all surplus ends have been cut off close underneath, the work is completed by the addition of the heading, which is fastened on as shown n Fig. M.

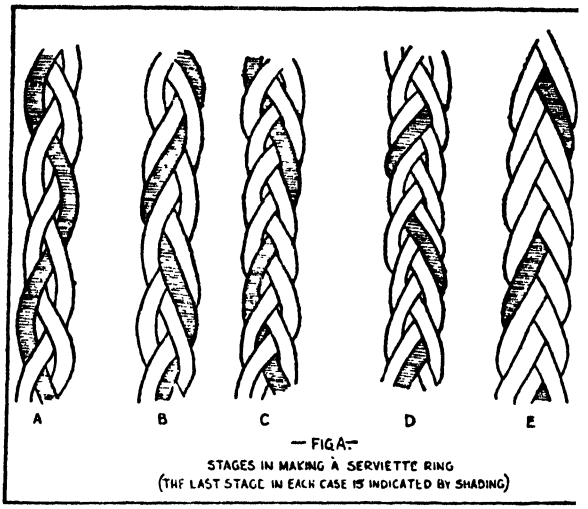


Details of Seat in Fig. Q.

CANEWORK, GIFT ARTICLES OF

As a diversion from the working of wood, metal, and other materials with which the home craftsman is more familiar, bent-cane work may be worthy of notice. The intention here is to show how one or two specific articles suitable for sale or as Christmas gifts can be made, but it may be of interest to mention in passing that cane (rattan, not bamboo) can be jointed, glued, nailed, bored, shaped and finished much in the same way as wood, and has the added advantage of pliability which enables it to be bent to form all sorts of interesting designs. The cane can be procured from cane merchants or handicraft material suppliers; drain canes and the thin canes with bent handles intended for the chastisement of errant youth, both procurable locally, can be utilised in articles for which their nature and respective sizes are appropriate. The actual dimensions and sizes of cane, etc., of the examples illustrated are given, but there are no hard-and-fast rules except perhaps in the case of the serviette rings, and even these can have two colours in the one ring instead of only one; for the rest the reader can enlarge or otherwise modify as his ingenuity may suggest, and also use the materials and methods for other kinds of articles. The requisite tools are given under the separate headings.

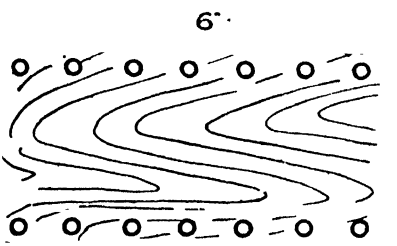
Serviette Rings.—Enamelled cane, sold in strips in various colours, is used, a 4 ft. length being cut off for each ring. Hold the end of this between forefinger and thumb of left hand, enamelled side uppermost, and coil the cane round twice, making two circles side by side of about $1\frac{3}{4}$ in. diameter. Now take the long end down between the two so that it projects to the left, cross the right-hand circle over the left-hand one, and take the long end through the opening, and over to the right. Next pass the right-hand circle under the left-hand one and the end through this opening to the left, and then, to complete the first round (A, Fig. A) pass the end



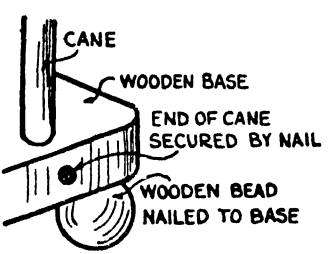
—FIG.A.—
STAGES IN MAKING A SERVIETTE RING
(THE LAST STAGE IN EACH CASE IS INDICATED BY SHADING)

down through the opening from which the first end emerges. Each round must finish in this place, the cane coming each time immediately under the first end. Four more rounds are now threaded (B, C, D, and E, Fig. A), and the two ends, one inside and the other outside the ring, cut off neatly with a sharp penknife. Some little patience and practice will be needed to get the correct seven-way plait, but once the art is acquired the rings can be made with surprising quickness and sell well at a good profit.

Toast Rack.—The general construction of this will be seen from the illustration. A wooden base (Fig. B), about $\frac{1}{4}$ in. thick, has holes drilled along its sides to take seven pieces of bent cane ranging in length from $8\frac{1}{2}$ in. to $10\frac{1}{2}$ in. These are secured by nailing, and four wooden beads with their holes plugged are nailed to under side of base. These details are shown in Fig. C.



—FIG.B.—
BASE OF TOAST RACK

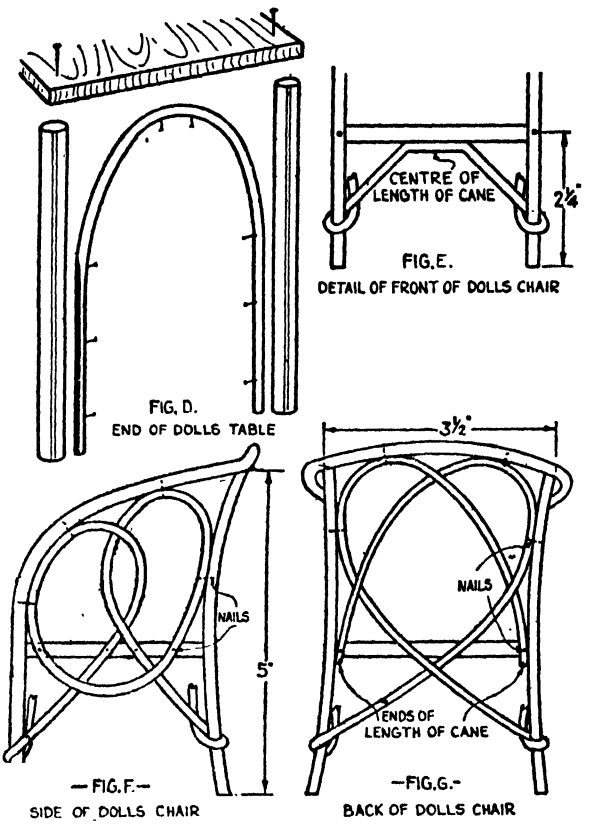


—FIG.C.—
DETAIL OF TOAST RACK

Doll's Table.—This has a top of $\frac{3}{16}$ in. plywood, 4 in. by 3 in. The legs, which are of rattan about $\frac{3}{16}$ in. in diameter, are cut to a length of $3\frac{1}{2}$ in. with a fine-toothed tenon saw and glued and nailed with $\frac{3}{8}$ in. panel pins to under side of top; dowelling can be used for the legs instead of cane if preferred. The curved supports are of No. 10 pulp cane, shaved at the ends and top as shown in Fig. D, and glued and nailed with $\frac{3}{16}$ in. panel pins. When the glue is hard the work can be cleaned up with No. 1 glasspaper.

Doll's Chair.—This is included as an example of work rather more advanced. The seat is of $\frac{3}{16}$ in. plywood, 3 in. square, with a curved notch cut or filed at each corner to take the No. 10 cane which is used for the

two back legs, and the piece which forms the front legs, sides, and back. This cane, together with the No. 8 used for the filling in of sides and back, should be soaked for a time to make them pliable. No glue is required, but the fine panel pins should be clinched except where driven into edge of seat, and this can best be accomplished by using pliers with long flat jaws. The No. 8 cane is 64 in. in length, and the two halves are worked separately, beginning at front of chair. Other details are shown in Figs. E, F, and G.



Cane Dolls' Furniture.

CARPET PLANNING AND SEWING

The carpeting of a room can be carried out by either of two methods—by means of a carpet "square," i.e. a complete carpet in one piece, or by the "body-and-border" method in which strips of carpeting are sewn together and provided with a border, the finished covering corresponding to the size of the particular room. In the first case no less than in the second, and also in connection with carpeting for stairs, corridors, and other parts of the house, and, again, in the case of rugs, which are simply small carpets, it is desirable to know something of the nature of carpets generally, particularly with regard to their differing textures, designs, colourings, and finishes, for on this knowledge depends the utilitarian point of view.

Persian Carpets.—Both historically and in order of excellence Persian carpets and rugs stand first. Made by hand, of very close weave, usually of wool throughout, and of good design and colouring, many of them come within the category of works of art, and some historic specimens are worth thousands of pounds. Sometimes the pile is of silk, but although beautiful in appearance this material is not so satisfactory in wear as wool, which is the ideal material for carpet making. The great majority of Persian and other oriental carpets and rugs are constructed by tying short pieces of thread to the foundation warp and

weft as illustrated by Fig. A, which is intended to show clearly the construction and is, therefore, not exactly to scale. English machine-made reproductions of Persian carpets and rugs can now be obtained, indistinguishable, it is claimed, from the originals except by an expert.

Other Imported Carpets and Rugs.—Turkey carpets come next to Persian, and have a large sale in this country, and supplies come from

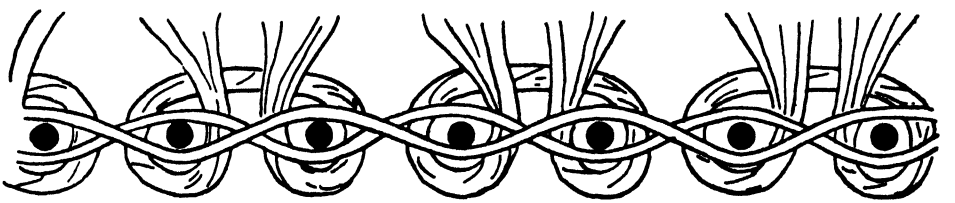


FIG. A.

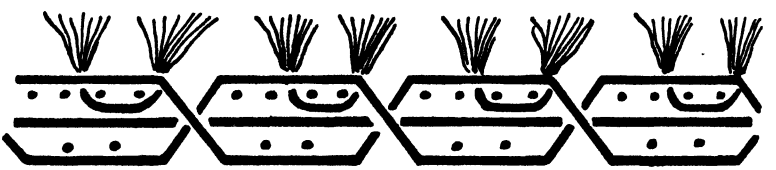


FIG. B.

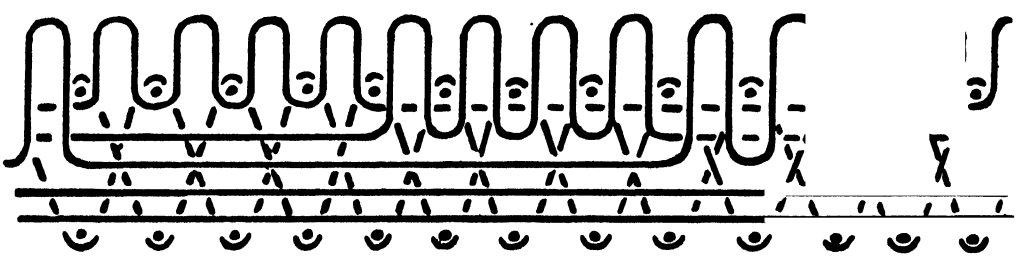


FIG. C.

Fig. A.—Section of Persian Carpet. Fig. B.—Section of Axminster Carpet.
Fig. C.—Section of Brussels Carpet.

several other parts of the East also, London being the chief distributing centre in the world. Indian carpets are among the commonest sold, though this is not always apparent, as designs copied from Turkey carpets are largely used. China may be mentioned as another carpet-producing country. Practically all imported carpets are hand tufted by native labour, against which this country cannot compete except on a small scale and for special designs and shapes. Nearly all British carpets are, therefore, machine made, but, while hand knotting or tufting is undoubtedly the best method of manufacture, it must not be

concluded that any hand-made carpet is better than any machine-made one; and British carpets, of which the principal makes will now be briefly described, have reached a high standard of excellence.

Axminster.—Hand-made carpets were at one time made at Axminster, but this branch of the industry is now confined mainly to Donegal, Carlisle, and Wilton, while the Axminster carpet is made in several places by machinery. It differs from other machine-made carpets in that it is tufted in a similar way to those made by hand, the tufting method giving great scope for variety of design and colouring while at the same time minimising the amount of pile material which is of necessity hidden in the body of other machine-made carpets. Fig. B shows in diagrammatic form a lengthwise section of Axminster carpeting. It is noteworthy that the present tendency is towards the production of large seamless Axminster carpets, woven in one piece instead of in strips which are later sewn together to form the complete carpet.

Brussels.—This make of carpet is distinguished by its looped pile illustrated in Fig. C, by which it will be seen that the pile threads pass along in the body of the carpet when not in use. This make of carpet is not so ornate or luxurious as those with tufted piles and is best suited to comparatively small and modest furnishing schemes. The patterns are well defined both in design and colouring and the fabric wears well.

Wilton.—This is similar to Brussels in construction, but with the loops cut to form a velvet pile. It is, however, made in higher grades than the Brussels, and a first-quality Wilton is regarded by many as the best machine-made carpet obtainable. For plain carpeting Wilton is hard to beat, the only drawback being the shaded effect caused by the pile becoming pressed down in some places more than in others, a defect common to all plain carpets with a similar surface.

Tapestry.—In this make of carpeting an economy in the use of the pile wool is effected by printing upon the threads the various colours required by the design, this being done before the weaving begins. By this method each thread forms a continuous series of loops, whereas the Brussels and Wilton require three, four, or five threads of different colours to form one row in the pattern. For this reason tapestry carpets can be produced more cheaply, and the range of shades that can be introduced is almost unlimited. On the other hand, it is not possible to secure a clear-cut effect in the pattern such as can be obtained by the other method. Tapestry velvet carpeting is simply tapestry with the pile cut, the relationship between the two being the same as that between Brussels and Wilton.

Kidderminster, Scotch, or Ingrain.—A section of this type of carpeting is shown by Fig. D, from which it will be seen that it differs essentially from the makes previously described by reason of the fact that it has no pile, but simply a plain, slightly ribbed surface. Either plain or twill weaves

can be had, and plain colours have increased in popularity in recent years.

The foregoing are the main types of carpeting, but the following may

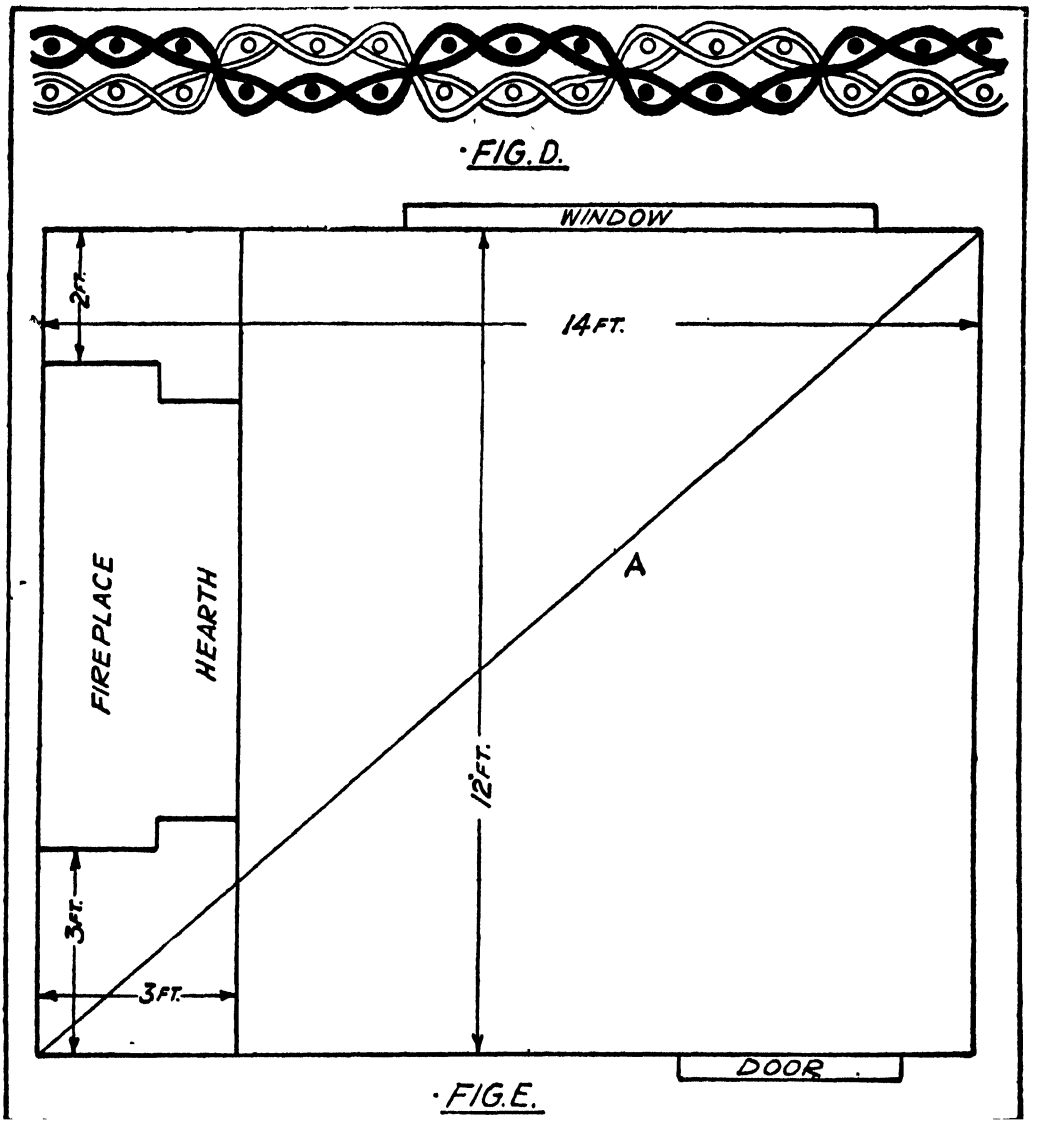


Fig. D.—Section of Kidderminster Carpet. Fig. E.—Measuring a Room for Carpeting.

be mentioned in addition: chenille Axminster, Saxony Wilton, hair cord, hair velvet, and carpets employing various other materials, either alone or in combination with wool. The modern tendency is in favour of seamless carpets, i.e. woven in one piece, with the surrounding floor

polished, or simply rugs upon a polished floor. Most makes of carpet can now be had in seamless squares as well as in rolls of standard widths. The latter are either made up by the manufacturer into carpets, or used for carpeting a floor in a similar way to that employed in the case of linoleum. The standard widths of roll carpeting, whether for stairs, corridors, or "body-and-border" work, are 18 in., 22½ in., and 27 in.

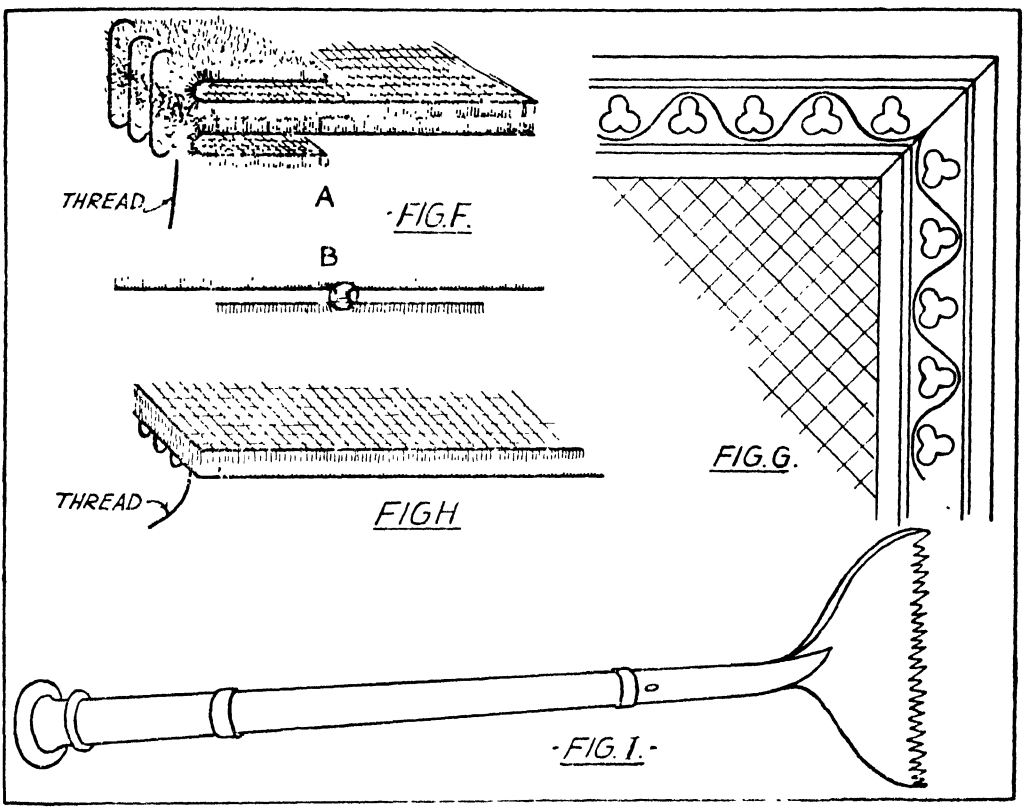


Fig. F.—Joining Cut Edges. Fig. G.—Mitred Carpet Corner. Fig. H.—Oversewing Selvedge of Carpet. Fig. I.—Carpet Stretcher.

Measuring a Room for Carpeting.—The best method of planning the carpeting of a room is to draw a plan to scale. The scale might be ½ in. to 1 ft., and if the plan is correctly drawn the amount of carpeting required can be gauged from it to a nicety. The room measurements are taken with a tape measure, and transferred to the plan by means of a bevel-edged rule and pencil. Begin by measuring two sides of the room which appear to be at right angles, and draw these faintly on the plan. Then measure diagonally from corner to corner and put in the line A, Fig. E. These three lines can then be adjusted to their proper

positions, and marked boldly on the plan. It will then be a comparatively straightforward matter to draw a complete plan of the room, indicating fireplaces, recesses, and any other irregular formations.

Calculating from the plan will show how many yards of carpeting 27 in. wide will be required, the strips running lengthwise of the room as this involves less sewing than would be needed if they ran crosswise. The requisite length having been obtained, the carpeting is cut up with a pair of stout scissors, and laid in position on the floor, a margin being left round the edges to allow for stretching. If bordering is to be used, this will be procured separately in 18 in. width and arranged round the edges of the body carpeting. The corners of bordering are cut to a mitre as shown by Fig. G, and the cut edges sewn together with carpet thread and a stout needle as shown by Fig. F, the method applying to all cut edges which have to be joined. In "body-and-border" work, plain carpeting or that which has a close all-over pattern naturally gives best results.

Having arranged the pieces on the floor, they will now be sewn together, selvedge edging being treated as shown by Fig. H. Ends of carpeting or rugs which have been cut are turned over and hemmed on the under side. After sewing or hemming, the carpet is placed face downwards, and the sewn or hemmed part damped and gone over with a heavy, heated iron. Carpeting should not be laid direct on to the floor, but over carpet felt which can be bought for the purpose. Stretching of the carpeting as it is being tacked down with carpet tacks is necessary, for which purpose a carpet stretcher (Fig. I) will be found very useful.

CEMENT CARVING

Cement which is mixed by the following method can be carved when dry.

Portland cement of the best quality should be used, and if possible with sand obtained by crushings and sievings from a well-known sandstone. Depending upon the size of the work in hand, a coarser aggregate may be used to back up a block that has a sufficient thickness of a finer aggregate equal to the depth of relief required in the carving.

Prepare a strong box or mould with easily removed clamps for the reception of the mixture of cement. Mix 3 parts of fine stone sand with 1 part of cement and pass through a fine sieve, then spray just sufficient water over so that when thoroughly mixed a handful may be retained in shape when the hand is opened out.

Into the clean and dry wood mould place a portion of the mixture and tamp well into the corners, adding more of the mixture all the while to ensure a uniformly solid block. After clamping a backboard on, the whole may be turned over, releasing the mould from the block by undoing the clamps and unhinged parts. After about six hours or so the block may be given a slight spraying of water, followed next day

with a more copious supply of water at intervals. The block, to attain that degree of hardness required for carving, should be allowed to dry out.

CHINA RIVETING REPAIR WORK

The drilling and riveting of china can, with suitable precautions, be accomplished by the amateur. The outfit required is a small diamond-pointed drill or a copper bit faced with carborundum. These may be driven in an archimedean drill in the hand, in a brace, or in a small lathe. To prepare the copper bit, take a piece of copper rod which is perfectly straight, make it red-hot, and plunge into cold water. Take a ¼ in. piece of hard wood about 1 in. square. Drill a hole in it to take your copper bit, place wood upon a piece of ½ in. glass, put a few grains of carborundum inside, and insert bit. Revolve the drill, add more carborundum, and continue revolving the drill until the end of the bit is embedded with grains of carborundum. In many cases the holes drilled do not go right through, but only about half the thickness. Drilling can be done with an archimedean or an ordinary bow drill (Fig. A). It is essential that the drilling device should be quite light, so that there is no risk of putting too great pressure on the drill point. It is necessary to have a diamond-pointed drill for starting a hole through extremely hard glazed surfaces. A piece of black diamond or bort cemented or soldered in the end of a piece of copper rod is used for this purpose. Having broken through the glazed portion, a softer drill may be used. It is best to use turpentine as a lubricant, keeping the drill point quite wet. If a large hole is to be bored through china, it is better to use copper tube and fine emery powder. Turpentine, paraffin, or camphor dissolved in turpentine should be used as a lubricant.

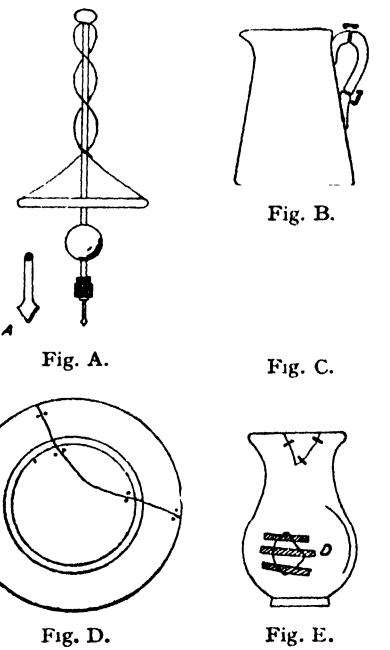


Fig. A. Fig. B. Fig. C. Fig. D. Fig. E.

China Repairs.

Fig. A.—Archimedean drill. Fig. B.—Jug Handle Repair. Fig. C.—Type of Joint. Fig. D.—Cracked Plate Repair. Fig. E.—Patch on Vase.

Riveted Joints.—The usual type of joint for holding the two parts of a broken article together is that shown in Fig. C. Here, inclined holes are drilled either part way through, in the case of thicker articles, e.g. dishes, sinks, lavatory basins, etc., or right through in the case of thinner china and porcelain items. The two broken edges are given a coating of china

cement and then pieces of brass wire, as shown at B, in Fig C, are made so that they can be sprung into the sloping holes in C and thus draw the two members together. It is a good plan to dip the wires B in cement before attachment. It is important to have each clip a tight spring fit in its two holes. Any crevices that are left in the joints after riveting should be filled with glass cement coloured to match.

Typical examples of china repairs are illustrated in Figs. B, D and E; these show, respectively, a jug handle, plate and small vase. The riveting method is preferable for the handle, in Fig. B, as a pair of plain cemented joints would hardly be strong enough in tension to take the weight of the jug and its contents.

The plate (Fig. D) has four bent rivets which go right through the china, for additional strength. If properly repaired in this manner, such a plate will be practically as strong as the original one. In dealing with articles such as that shown in Fig. E, the lower broken piece at D can be repaired with cement alone, using pieces of surgical tape on both inside and outside to hold the broken part in position whilst the cement sets.

Cements for China.—The majority of minor repairs to china and crockery, such as the breaking off of small pieces from the edges, can be done by the simple process of cementing the edges of the broken portions and pressing same together to set hard. Various proprietary makes of cements are available. One of these, of a cellulose varnish-like nature, known as Durofix, will make sound joints in glass and china which will withstand the effects of hot water. It is necessary to give two coats of the cement to the broken edges, allowing the first to dry properly, and then applying the second. When the latter is just tacky, press the two parts together and allow to set in the same way. Usually, with the aid of some string or a weight, the necessary pressure can be applied to the joint until it sets.

Gelatine mixed to a thick consistency with acetic acid makes a good cement for white articles. For coloured china pigments can be added. Waterglass is another adhesive for china.

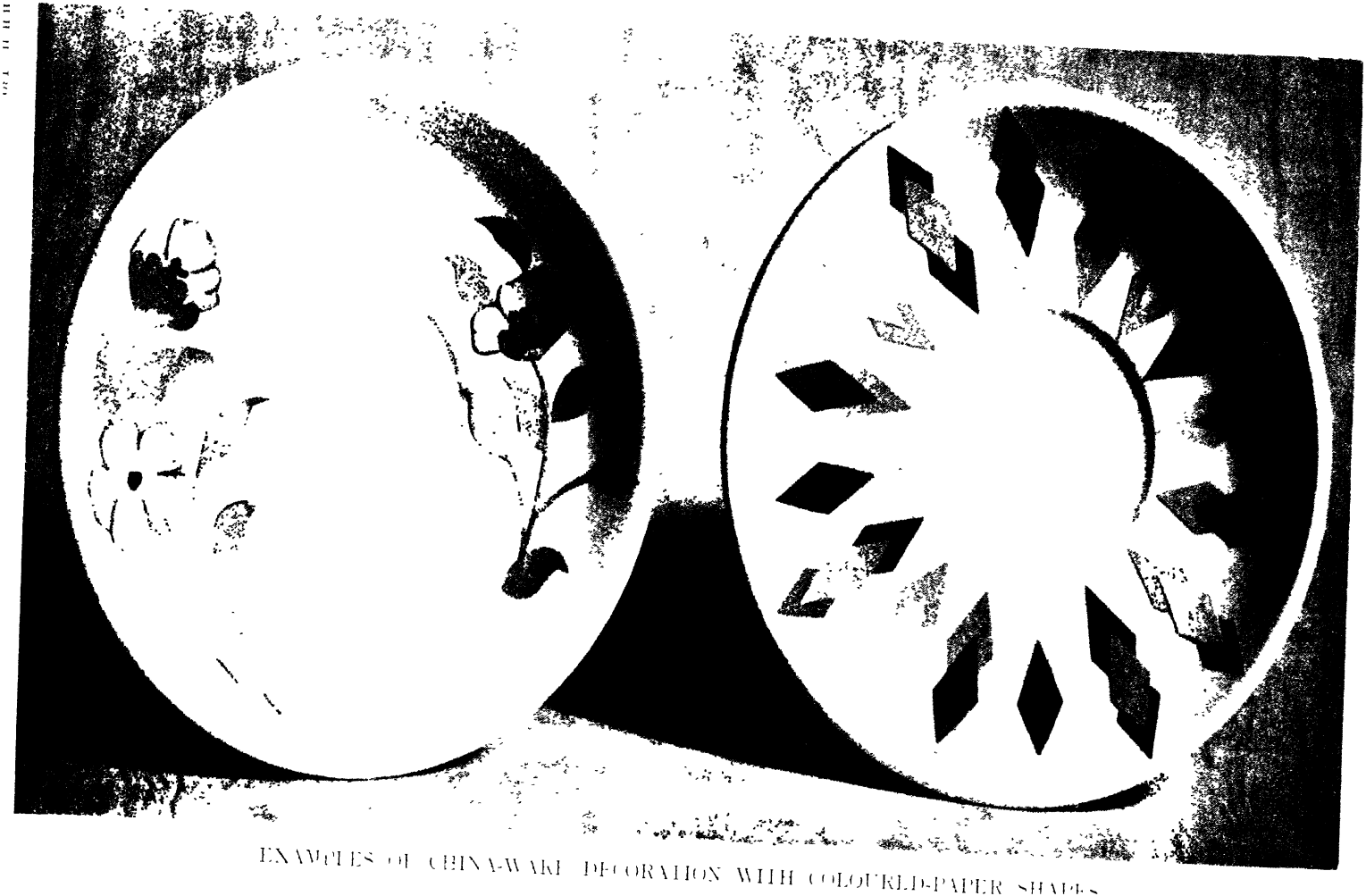
If the cement used does not match the colour, the joint may be touched up with an appropriate cellulose enamel afterwards.

It is important in all china repairs to apply thin coatings only of the cement.

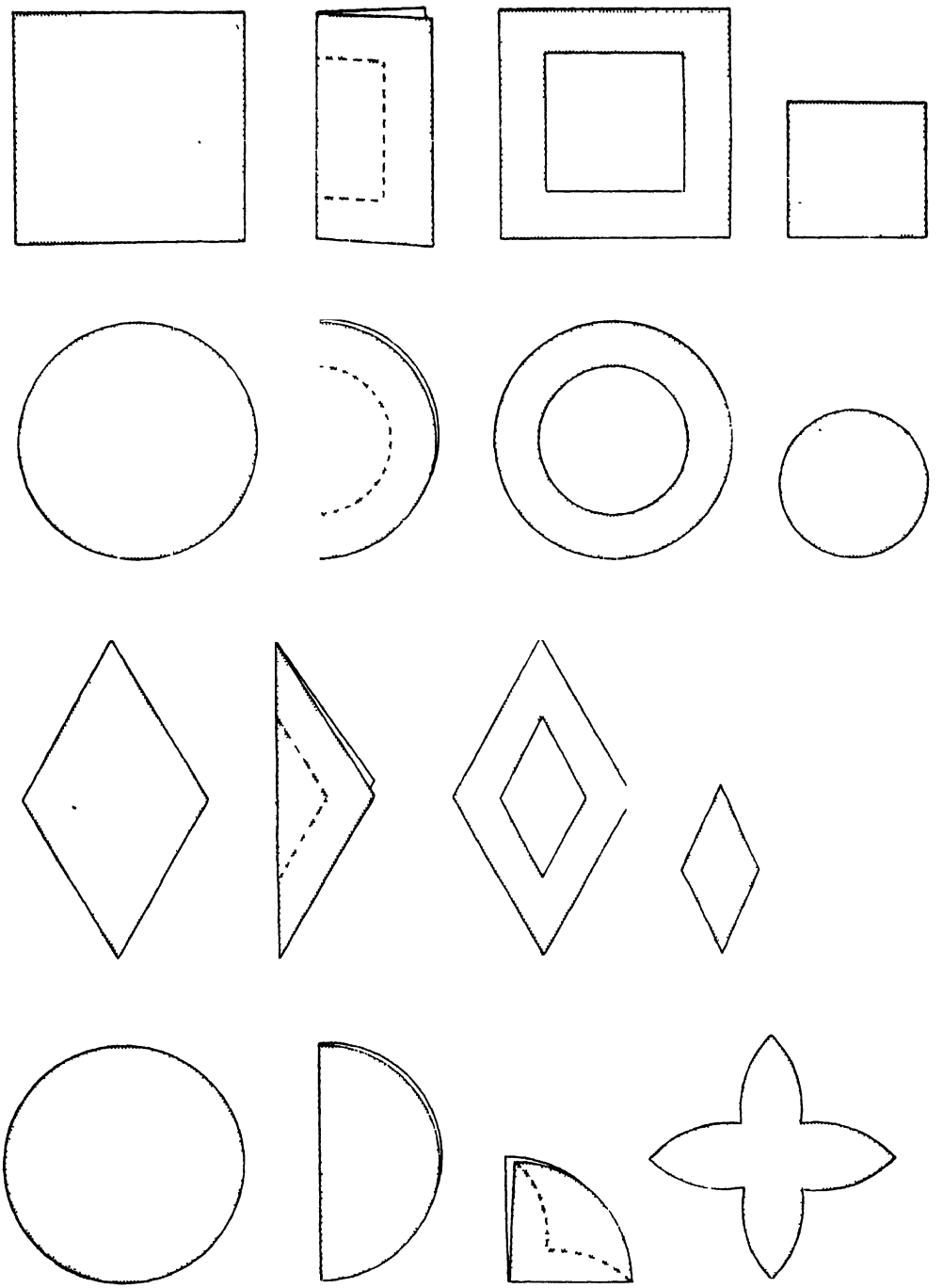
DECORATION WITH COLOURED PAPER

The art of picture and design building with cut coloured paper is becoming increasingly popular in the home and is being used for all kinds of decorative work. Wall decoration, frieze work, the decoration of boxes, tins, jars, plain cover books, lettering and poster work are some examples of work which may be undertaken by the coloured-paper craft worker after a little practice.

One of the great advantages of this craft is that the initial outlay



EXAMPLES OF CHINA-WARE DECORATION WITH COLOURED-PAPER SHAPES



Some Examples of Additional Shapes Obtained by Cutting after Folding

is so very small; an assortment of coloured paper, preferably ready gummed, in sheet form, a box of ready punched out paper shapes, a pair of scissors, a damper, are all that is really necessary to commence serious work.

The Plate facing this page shows three examples of friezes which have been prepared from coloured paper shapes. One is made up from small squares and ellipses, the second from squares, elongated triangles, and strips, while a third is made up from strips and circles. These are just simple frieze motifs, yet they look most attractive in their rich assorted colourings. After a little practice, endless designs and patterns may be built up in any colour scheme to match in with the general colour scheme in the home. These little friezes make up excellent panel and frieze effects and are quickly carried out by the worker with little time at his disposal.

After some little practice, more and more involved designing will follow. These little paper shapes are ideal for decorating boxes and tins of all kinds.

Many useful presents and articles for the home may be made with the aid of these shapes, and such items as empty boxes, jars and tins may be converted into something useful and decorative.

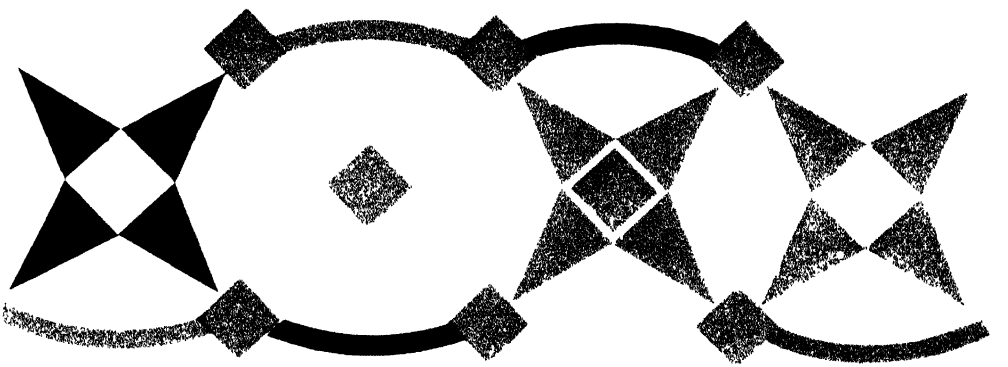
Box Decoration.—First of all, cover the box entirely with a suitable coloured paper to serve as a background to receive the decoration. The covering should be put on smoothly in order to get the best results. When the decorative work has been completed, the box will be greatly improved, and at the same time become more durable, by the application of a coating of copal varnish.

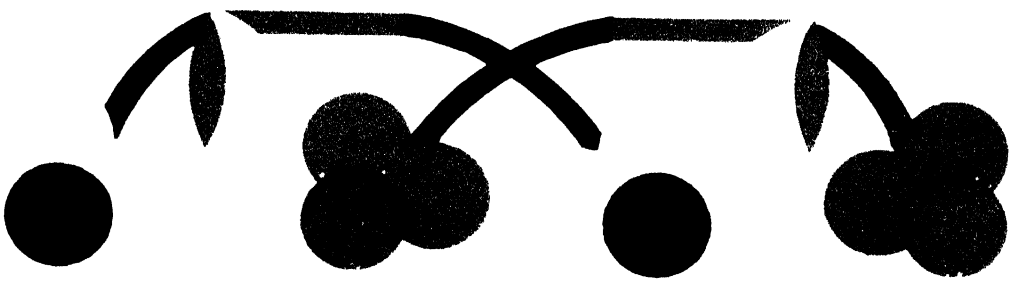
China Plates, etc.—Flat white plates, that is, those without a corrugated edge, are best for the work. First of all, draw on a piece of paper the shape, in the exact size, of one quarter of the plate; then work out a design to fit this which can be repeated on the other three quarters. Press the paper, when wet, very carefully on to the plate so that no bubbles remain to spoil the finished work. Here again, a coating of copal varnish will greatly enhance the work. China and glassware so treated are most suitable for fruit plates, cake and bread-and-butter dishes and so forth. They should not be dipped in very hot water when washing.

Glass Jars, etc.—Glass jars are excellent practice and, if the right kind are available, most interesting work may be carried out. Mayonnaise and salad dressing bottles, ginger jars and similar shaped vessels are ideal for the work. The neck may be decorated with strips of coloured paper (plenty of greens, orange, red and yellow are first-class colours), coloured triangles, circles for the middle and curved strips for the base.

Match-box Decoration.—Empty matchboxes have a ready use in the home for many items, such as pins, needles, drawing-pins, etc., while boxes in a slightly larger size make useful receptacles for card games of all varieties. First of all, as previously pointed out, the whole area of the box







THREE EXAMPLES OF FRIEZES FROM COLOURED PAPER SHAPES

will have to be covered, preferably in some dark-coloured papers. The decoration may be hearts, diamonds, clubs, spades and similar motifs. The more ambitious worker may like to cut out neat letters and affix to the box top to serve as a means of ready identification.

Tea and Coffee Tins.—Much use may be made of empty cocoa tins and, when suitably decorated and with a suitable hole punched in the lid, they may be made to serve as a money box for the family. Alternatively, these empty tins make ideal containers for loose items such as tea, sugar, rice, currants, and so forth. First of all cover the tin with a base paper and then cut out some neat letters and affix to the tin in the right position. A whole series of tins may be prepared, as time goes on, for kitchen use.

Paper shapes are obtainable ready punched or they may be prepared by means of a stencil. First of all a master shape is cut, say a circle, square, diamond and so on. From this key shape (stiff card should be used) endless numbers of shapes may be obtained. Furthermore, other shapes may be obtained from these pieces by folding and cutting. In this way, a square may be folded as illustrated and cut so that a smaller square may also be obtained. By mixing colours and by superimposing pattern upon pattern and colour upon colour, all kinds of interesting designs may be built up.

Greetings Cards, etc.—Seasonal greetings and birthday cards, calendars and gift cards may be designed individually. The first essential is a stout piece of card, neatly cut to the desired shape, and the decorative work may be worked out to suit the occasion. For calendars, the pad complete with ribbons may be purchased in the stores ready to affix to the decorated card. Ribbons, tassels and other necessary accessories may also be obtained.

Free Cut Work.—So far, the greater part of the work involved in these suggestions covers the use of ready punched out gummed shapes and hand-prepared shapes produced from stencils. Very excellent and individual designs may be obtained from free cutting which is the real handicraft. Bold cutting of shapes with scissors from various coloured papers will produce some charming effects. Working out a picture is fascinating work, all the individual pieces fit together to make up the finished picture or design, just like a jig saw.

To commence, patterns and pictures may be traced from illustrations from magazines by the aid of tracing paper. The skilled handicraft worker, however, will be able to clip and cut each individual piece or shape without aid of any kind. Coloured papers are available in glossy and matt finishes, so that bright and subdued effects may be obtained as desired.

Here are some of the important things to remember in free hand cuts and open designing. Work boldly, and avoid all small detail. Use the brightest colours and work in matt shades for effects. Do not affix all the

components of a picture or design down to the background until you are absolutely satisfied with the finished effect. Move the pieces round and round in order to get the best composition.

Any kind of paper may be used for the design; oddments from fancy papers, wall-papers and offcuts or bright wrapping papers. All of these may form part of a decorative scheme. Brick and tile papers may be obtained for those handymen who make model houses, farms or doll houses.

No special artistic knowledge is required for this handicraft. Its application is wide and, in addition to the results produced, there are endless hours of fascinating amusement for the home worker. Wise choice of colour, good designing, clean cutting, neatness and good arrangement are among the essentials of the craft. Once these first essentials are mastered, all kinds of pictures, patterns, designs, borders and general decoration will be possible.

DUPLICATOR

Club secretaries, and others who have often to run out a large number of copies of notices, etc., either typed or written, will find the little duplicator about to be described a great saver of both time and money. It does not employ the sticky gelatine mixtures sometimes advocated for such devices; instead, it works on the stencil principle thus. The matter to be copied is typed or written on a sheet of thin waxed paper. If it is hand-written, a special pen must be used. These pens have a sharp little wheel at the end of the "nib" which cuts the wax, and so makes a stencil. If a typewriter is used, however, there is no need for any special device; all that requires to be done is to remove the ribbon and the type will cut the stencil.

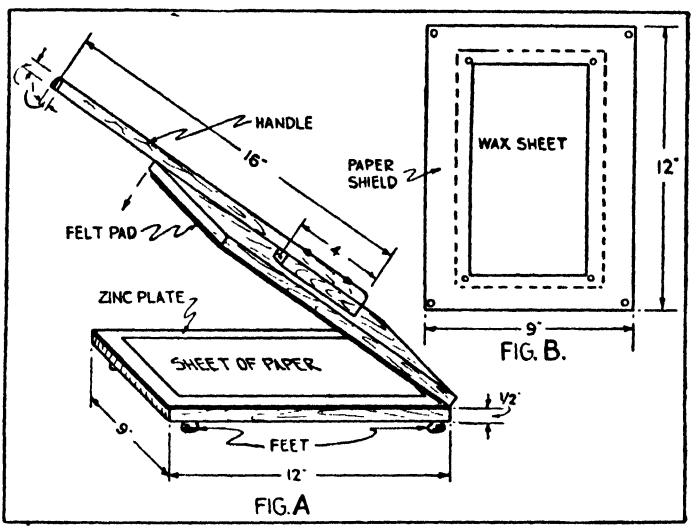
The waxed sheet is now fixed with drawing-pins in front of the felt pad (see drawing), the reverse way to what it was when written on. The pad is saturated with printer's ink, and on squeezing this down on to a sheet of semi-absorbent paper, placed on a hard surface, the ink oozes through the cut portions of the stencil, and so impresses itself on the paper.

Briefly, this is the principle employed, and now we shall see how it works out in practice.

Making the Machine.—The duplicator (Fig. A) is very easily made. Two pieces of deal, 12 in. by 9 in. by ½ in., should be planed up smoothly. Take care to choose well-seasoned pieces, so that they will remain quite flat, even after much use. They might advantageously be reinforced with transverse stays to accomplish this, but if the wood chosen is of good quality, these will hardly be necessary. From a plumber obtain a piece of sheet zinc, 12 in. by 9 in., such as is used for the ridges of houses. This is tacked to the lower board with small nails (sprigs) driven in flush. Lines should be scribed on this plate, for guidance in placing in position the sheet of paper to be printed on. On the other board a piece of thin, smooth felt 11 in. by 8 in., is fixed by means of small, flat-headed drawing-pins, pressed in flush. The felt may be obtained from any large firm of

hat manufacturers for very little. This is detachable, so that it may be taken off, saturated with ink, and put on again. The two boards are now hinged together in such a way that the two inner surfaces are in contact all over. A long handle, such as is shown in the sketch, is now fitted, and the machine is complete.

Working the Machine.—To work it, take the felt pad, thoroughly moistened with printer's ink, and pin it to the upper board. (Take care not to have the felt too moist, or the result will be smudged.) On top of this goes the stencilled wax sheet, the opposite way to that which it was written on. Now take a sheet of glazed paper, 12 in. by 9 in., and from the centre cut a hole large enough to uncover all the written matter



Details of Printing Duplicator.

on the wax sheet, and pin this over the whole thing, thus forming a shield. (See Fig. B.) It should be very thin paper, and need only be used if the wax sheet does not completely cover the inked pad.

Printing.—All is now in readiness for printing. A sheet of semi-absorbent paper is placed on the zinc plate, in the position indicated by the previously scribed lines, and the top portion brought down on it. A firm and even pressure is applied, and on lifting the lever the sheet will be seen to be printed. Fifty or sixty, or even more, copies can be made thus, in a very short time.

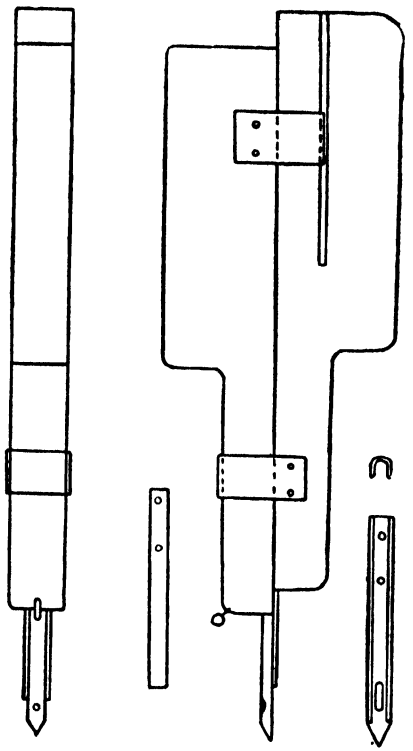
The wax sheets can be bought from any typewriter supply store, or can be readily made by soaking very thin sheets of paper in paraffin wax. The ink is sold commercially in many different colours, and may be obtained from any printer. It should be made up rather thick, as it will smudge if too fluid. If the reader follows the foregoing instructions closely, there is no reason why his machine should not be a great success.

KNITTING-MACHINE FOR RUGS

The hand method of making rugs from cloth or wool is long and tedious, and the time spent increases the price of the rug made.

The sketches illustrate a useful little machine with which excellent rugs may be made, in the shortest time possible, by hand.

Construction.—Two pieces of hard wood are required, ½ in. by 1¼ in. by 6 in. long. These are shaped as shown in the sketch, one piece having a slot cut in it as shown.



Automatic Rug-making Tool.

Two pieces of strip tin are shaped to suit the wood; one piece slides in the slot in the wood; both act as guides, and keep the two pieces of wood together.

The needle may be made from channel brass, or knocked up to shape from sheet brass. A piece of clock spring is fixed in one wood piece by screws or nails, or may be made adjustable by filing a slot in which the nails or screws can fit. Thus the length of stitch can be regulated. The clock spring is an easy fit in the channel of the needle, which is fixed to the other piece of wood, as shown, the screw eye being fixed to the piece on which the needle is attached.

Using the Machine.—The method of using the machine is as follows :

Place the sacking, or backing, on a box or frame, and stretch firmly. Cut some long lengths of cloth that will pass through the eye of the needle comfortably, having previously passed the cloth through the screw eye, and leaving an inch of the cloth projecting through the needle. The long length of cloth is spread out to the left hand. Push the needle through the sacking, then push the spring down, keeping the needle in position, then withdraw the needle, and continue inserting and withdrawing until the cloth is used up, then thread again and continue as before.

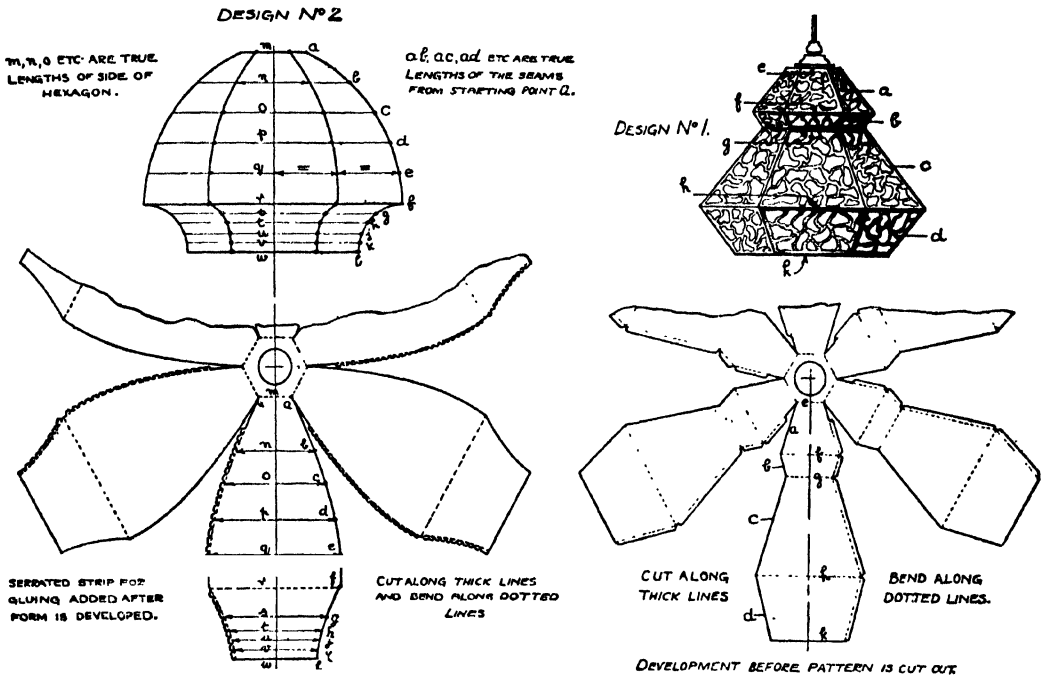
For tight knitting, lean the machine over to the right slightly; for loose knitting, lean the instrument over to the left slightly.

Always slant the instrument a little towards you.

Always push the needle through the canvas first.

Use the instrument lightly but firmly.

A little practice will be required, and by keeping the needle well down an even stitch is obtained, and good work can be performed with ease in a short time.



Two Attractive Lampshade Designs.

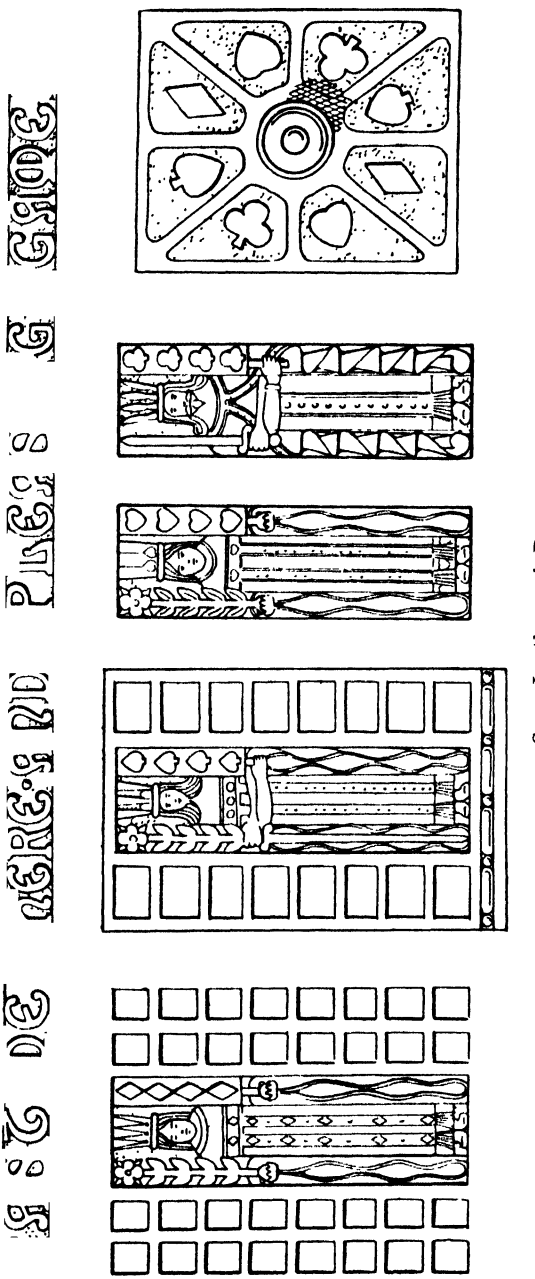
LAMPSHADES

The attractive lampshade designs shown in the accompanying illustrations may be made in stout drawing-paper, finishing in any colours desired.

The development shown in the drawings should be followed accurately.



Some Further Lampshade Designs.



Some Leatherwork D

LEATHERWORK

The decoration to be treated here is aptly described as "modelling": for it has nothing to do with cutting or carving the face, nor with stretching or embossing from the back. It is simply a *reshaping* of the surface.

To the aspirant it is, therefore, recommended: first, to make acquaintance with the art of modelling by experiments in clay or plasticine; then, to continue, with odd scraps of leather, to master the idiosyncrasies of this material. For the artistic use of these peculiar qualities is the foundation of his craft.

The design should be carefully chosen (or, preferably, made) to agree with the shape and intended use of the article.

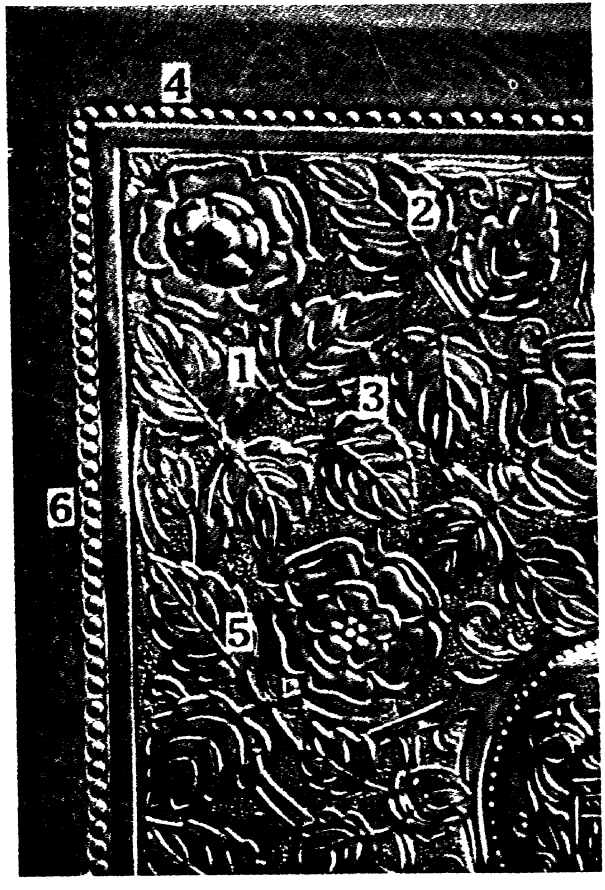
In particular, the ornament must be so disposed that fastenings, etc., do not encroach upon it.

The leather must be English calf (except that "hide" can be used for *very* broad effects, and "basil" for practice *only*), specially prepared for modelling.

Modelling.—The whole surface being sufficiently moistened (not saturated), the design is fastened over it, and the lines lightly impressed on the leather by tracing with a hard point (an H pencil is good).

Modelling begins with the background. Keeping the surface damp, work round the outline of the ornament with the broad end of the modeller (Fig. D) held as shown at Fig. G, and drawn *backwards*.

It is best to work just clear of the traced lines, leaving the outline





ATHER MODELLING

to be finished, with advantage of a gain in depth, after the background has been sunk.

As soon as a space is enclosed, sink the whole of its surface, holding the tool as at Fig. G, pressing firmly, and moving *sideways*.

When sunk, the background is "matted" with a punch (Fig. F), or "pricked" with a large needle. Be careful to hold the punch upright, and strike gently: first work round the outline, then over the enclosed space; do not let the indentations cross each other, or the result will be unsightly.

The ornament, which now stands in relief, is next to be modelled. If you desire a realistic (or natural) effect, be warned against too much detail—make artistic choice of those features only that help the design. Conventional forms are often preferred as better suited both to the nature of the material and the suggestion of antiquity.



FIG. C.

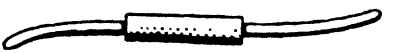


FIG. D.



FIG. E.



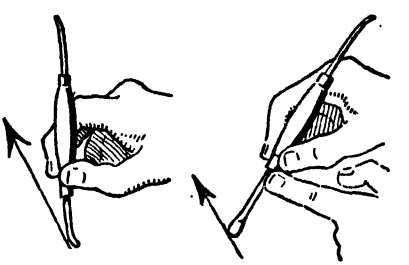


FIG. G. FIG. H.

Tools Used in Leatherwork.

Most of the problems you will meet in modelling are illustrated, and the following are the methods of attack:

For straight lines (14), Fig. A (facing page 138), the modeller is guided by a straight-edge, which must *not* be of iron or steel, since contact with these metals stains the leather.

The Dresden tool (Fig. C) is usually preferred for developing undulations, such as the curling petals of flowers (5), and the rounded forms of berries. Crossings of leaves or stems are produced by slightly sinking the lower, where it appears to pass under the upper (2).

Veins (1) are made to stand out by sinking on both sides.

For serrations, and like forms (3), either end, as required, of the modeller is pressed vertically into the leather, and withdrawn by sliding.

A ring punch (Fig. FA) is useful for stamens and borders (6).

Lettering is illustrated at 15, Fig. A, and punched background at 16.

When background *encloses* ornament, 13, the depth of sinking is gradually diminished until it blends inconspicuously with the surrounding surface.

Colouring and Finishing Work.—Having finished the modelling, remove any stains by rubbing gently with cotton wool, dipped in benzene; then finish by staining. Spirit stains are recommended as easier to use than water stains. The deservedly popular "antique" effect is got by mixing nut-brown with a little blue. Other colours if preferred may be

used in monotones or conventional combinations; but realistic colouring is, for leatherwork, utterly unsuitable.

Mix *more* colour than you need—it is very difficult to match—and wash on quickly with a large camel-hair mop (as used for water colour). Begin with the background: if the surface is large, tilt it slightly, and do not have the brush too full, or the colour will run into ugly streaks. While the leather is still *just damp*, give it a second wash, and continue until you reach the required shade. For very small spaces in the background have ready some colour mixed a little darker, and give one wash only. Leave the ornament till last so that you can secure a pleasing contrast with the background.

When quite dry the surface should be polished with cotton wool and a little prepared wax: this, at any time, is an excellent preservative for the leather.

The variety of objects to which this craft can be applied is very great. Wherever flexibility and strength must be combined with light weight and endurance of much rubbing and handling—or, alternatively, exposure and neglect—leather only will fit the circumstances.

Nor is the craft too difficult. Some articles, such as mirror backs, book covers, and boxes, require skilful fitting, and should only be attempted after practice with easier subjects: but simple panels for table runners, blotters, serviette rings, and even the slightly more complex vanity bag, may be confidently undertaken without fear of disaster.

And whether your work be for sale or gift, or even for your own use and satisfied contemplation, all the requirements of an artistic craft, viz. scope for expression of one's personal feeling, joined with the pleasure of creating something to endure as structurally and æsthetically good, are fulfilled by modelling in leather.

LINO-CUTS

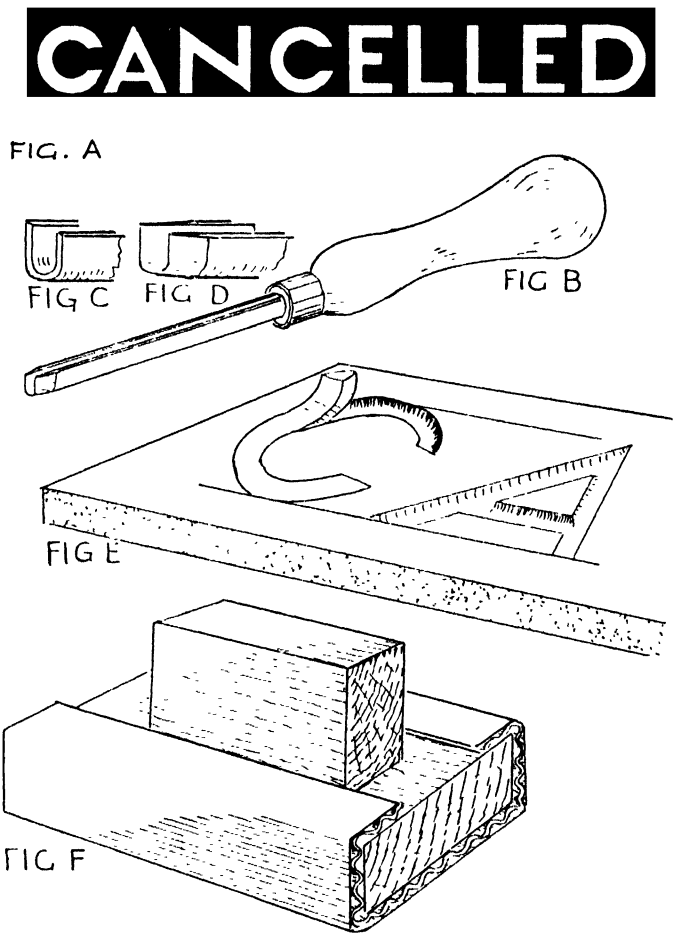
As a means of pictorial decoration, lino-cuts are popular and provide a highly interesting and comparatively simple form of craftwork. It is not only as an artistic craft that the lino-cut is of use, for the tools and materials can be used to make printing blocks of various kinds and so take the place of rubber stamps. Headings for general notices and designs for small posters are possibilities.

The simplest form of lino-cut is one in which the design or pattern is incised, leaving it white against a black ground. A suggestion is given at Fig. A for a cancelling stamp to be used for obliterating the address on an envelope to allow of a new address to be written on the back and thus economise stationery.

The main difficulty of the beginner is to cut good lettering and, although the Roman alphabet is by far the most artistic, the block letter used in the design at Fig. A is effective and simple. Apart from the curved letters which can be formed with a pair of compasses, the rest of the lettering can be drawn with a ruler.

The linoleum should be fairly stout and preferably brown in colour. The pattern should be drawn out full size and then a tracing made in ink. Apply the tracing face downwards on the smooth surface of the linoleum, using flour or starch paste, and place under pressure until dry.

Special lino-cutting tools are available, but a lot can be done with a sharp penknife and a gouge made from a broken umbrella rib fitted in a bradawl handle as shown at Fig. B. The end should be ground smooth as at Fig. C and then ground or filed on the outside as at Fig. D. It is advisable to do the gouging gradually rather than attempt to take out the complete cut at once as indicated at Fig. E. With practice, complete cuts will be found simple enough when control is gained over the tool. Straight cuts with a knife offer no difficulty, but care must be taken to prevent undercutting. Having completed the cutting, soak the transfer off and glue the lino to a block of wood.



Lino-cuts.

In use the block can be inked on an ordinary inking pad, or it can be coated with ink or paint applied with a brush. Usually lino prints are made on absorbent paper which is slightly damp, but this is not essential when using ink suitable for inking pads or ordinary printers' ink. Large blocks should be coated with a brush and the paper made damp. Place the paper on the block and rub it over with a rubber-covered roller or with a pad made as shown at Fig. F. The lower block should be about 4 in. by 3 in. with a top piece about $2\frac{1}{2}$ in. by $1\frac{1}{2}$ in. by 1 in. Cover with

corrugated paper and then with vegetable parchment or greaseproof paper as shown. Paper used for cyclostyling is excellent material for use in printing small posters or notices.

LIQUID LEATHER, METHOD OF REPAIR

Worn leather soles can be renovated with good long-wearing results by first cleaning the leather with lighter-brand petrol and then roughening all over the surface with a piece of hacksaw blade so as to obtain a good rough condition. Three coatings of black rubber solution, as used for sticking rubber soles on to leather shoes, are then given, each coat being allowed to dry thoroughly before the next is applied. When the last coat is dry spread over to a thickness of about one-quarter inch or so a layer of the liquid leather preparation, known as Rhinosole as sold by the 6*d*. stores. Apply and smooth off evenly all round with a domestic knife blade. Then put in a warm place for one or two days to dry off hard; the hot linen cupboard or the kitchen shelves will be found convenient for drying purposes. This hard synthetic rubber wears much better than ordinary leather.

The method described is equally suitable for repairs to the soles and heels of tennis or gymnasium shoes.

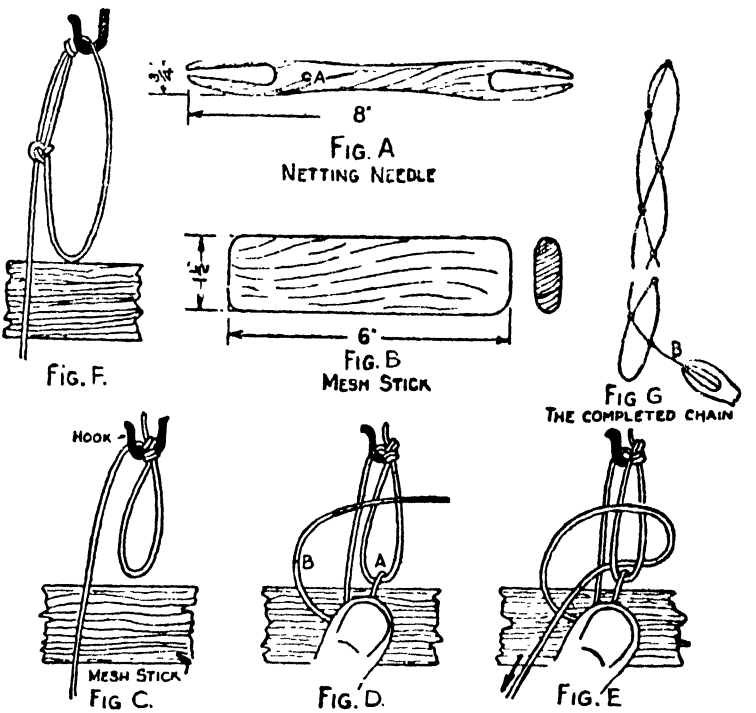
NET MAKING

To the man, particularly if he be a brain worker, in search of a light, simple, interesting, and useful handicraft, in the practice of which he can find relaxation, netting can be recommended. It is easily learnt, and the instructions given below will enable the worker, after a little practice, to produce not only hammocks, but other useful things also : nets for tennis, fishing, and other sports, fruit netting for the garden, and so on.

Equipment.—The equipment is simple and inexpensive, consisting as it does of two items only, a netting needle and a mesh stick. Fig. A shows the needle, which is made from pear or other suitable wood $\frac{1}{8}$ in. to $\frac{3}{16}$ in. thick and Fig. B, the mesh stick, which is simply a flat piece of hard wood somewhat thicker than the needle.

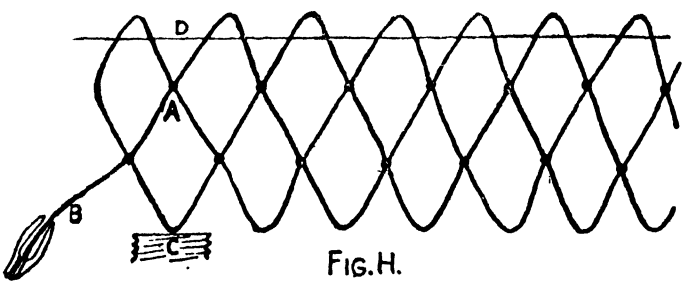
Construction.—Ordinary string, smooth and of good quality, is a cheap and suitable material for the hammock, and the needle is filled with this by fastening the end in hole A, Fig. A, and taking string up one side of needle and down the other lengthways till needle is full. A loop is now made at the free end of string, and the knot placed over a nail or hook fixed in a convenient position. This is illustrated by Fig. C; which also shows the mesh stick (held in the left hand with the thumb in front and fingers behind) in position. To form the knot, pass needle under mesh stick and bring it through the loop as at A, Fig. D. Draw string tight, hold it with the left thumb, and let it lie loosely to the left, B, Fig. D. Lastly carry needle behind loop and through to the front between loop and single string, passing it also through the loop B, Fig. D. Fig. E shows the completed knot before it has been pulled tight, and when this has been done the mesh stick is removed.

In Fig. F the work has been turned so as to bring the single string to the left, and a second knot is now made in precisely the same way as the first. The mesh stick is again withdrawn, the work turned, a third knot made, and so on until a chain of eighty knots has been completed. This is shown in Fig. G, with string and needle at B. In Fig. H this chain has been opened out at right angles and represents the width of hammock, the needle and string B being on the left.



Illustrating Net-making Methods.

The netting is now to be continued in rows, working from left to right, till forty-one rows have been added. For the first row hang each mesh separately on the hook, as at A, Fig. H, while the knot is being formed round the loop below it, C, Fig. H. The newly formed loops will remain on the mesh stick till a row has been worked, when the stick is withdrawn and the work turned so as to bring the string to the left ready to begin the next row. After one row has been worked by placing each mesh separately on the hook, a piece of string D, Fig. H, is threaded through the first line of loops, its ends are tied together to form a loop which is hung on the hook, and the work held in this way while remaining rows are worked.



Net-making Details. Chain Opened Out at Right Angles.

A simple method of finishing the hammock is shown in Fig. I. An ash

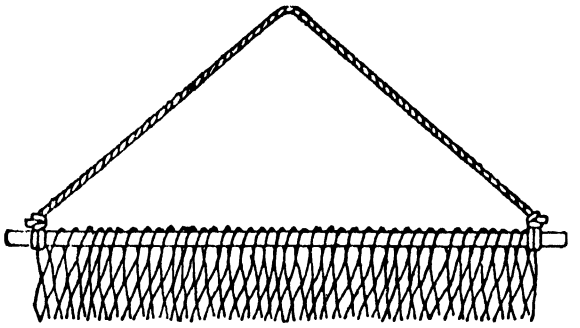


FIG. I.

Net-making Details. End of Hammock.

stick, ¾ in. to 1 in. diameter and 2 ft. 6 in. long, is threaded through the end row of loops, and to this a piece of stout cord is attached in the manner shown, the end meshes of net being held by the cord to keep hammock stretched out. The other end is treated in the same manner, but in this case the stick is shorter, say 2 ft.

PAPIER MÂCHÉ WORK

Although the machine-made papier mâché article is made from paper pulp which is highly compressed, glazed, and enamelled, serviceable articles can be made at home with very little apparatus, as shown at Fig. A. Instead of specially prepared pulp, ordinary newspaper is utilised; it is thoroughly soaked in water and applied to a mould in layers with paste between. The first thing to do is to obtain a suitable mould which should have a glazed surface for preference, and as it is as well to use a simple shape to begin with, it is suggested that a small tray, made to the shape of an earthenware meat dish, should be chosen. It is convenient to have two moulds of the same size, but this is not essential.

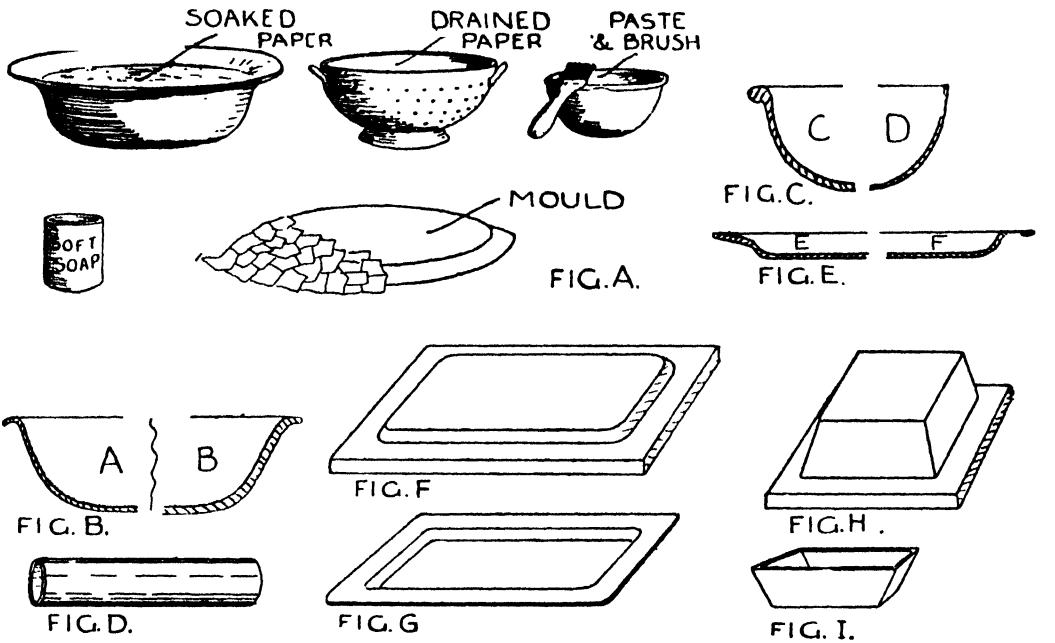
Preparing the Materials.—Several newspapers should be torn up into small, irregular-shaped pieces, not more than about 4 in. across, and placed in a large bowl of water and left for several hours until thoroughly soaked. In the meantime, prepare some flour paste by mixing ordinary white or rye flour with water to form a stiff batter without lumps. Thin the batter down to the consistency of cream and then add boiling water slowly, stirring vigorously until the paste thickens. When the paste is cool add a few drops of oil of cloves. Provide also a wide brush with which to apply the paste.

Shaping the Pulp.—When the soaked paper is ready remove it from the water and place in a cullender to drain off the surplus water and then cover the outside of the dish with soft soap; this is to prevent the paper sticking to it. A layer of paper is now placed on the soaped surface so that it is entirely covered, each piece laid down overlapping the next piece about ¼ in. The entire surface is now coated with paste and another layer of paper applied, but care should be taken that, as far as possible, the joints of the under layer are covered. When the second layer is complete, cover with paste again and then proceed with a third layer, and so on until a thickness of ⅛ in. or more is obtained.

It will be seen from the above directions that the work is quite simple, but there are several important points to watch. In the first place the

irregular pieces of paper must overlap and they must not be too wet; in each layer all joints must be covered and the paste must be brushed on thoroughly, for the pasting operation has to fulfil two purposes, that of applying the paste and also of pressing the new layer down on top of the under one. Very little paste is required, but the brush should be stroked very thoroughly over the whole of the surface. The projection of the paper over the edges of the dish does not matter, as any surplus material can be cut away later.

When a sufficient thickness of paper has been applied, the final coating of paste should be done with considerable care in order to ensure a smooth



Implements and Methods Used in Papier Mâché Work.

surface, any irregularities of thickness should be corrected, but care must be taken that there are no irregularities caused by air bubbles between the layers. The fingers can be moistened and rubbed over the surface, working from the centre to the outside, but it is safer to avoid bubbles by thoroughly brushing at each layer. The work is now placed in a warm room to dry; some workers place the papier mâché in an oven but it is better to allow it to dry slowly unless a double mould is used. If in the present shape a second dish is available, the under surface can be coated with soft soap and placed on top of the paper. A weight should be placed on top and then the work can be dried quickly.

The final shaping of the dried shape is done by sawing away the uneven edges and rounding them off with glass-paper. The inner surface should

be perfectly smooth owing to its contact with the glazed dish, but the outer surface may need smoothing with glass-paper. This work should not be attempted until the papier mâché is perfectly dry.

Some Types of Papier Mâché Articles.—Having made one shape satisfactorily, various shapes in trays, bowls, and dishes, either earthenware or enamelled metal, can be used as moulds. Wooden boxes can also be covered, but the surface of the boxes should be enamelled and should be of such a shape as will allow the paper shape to be taken off when dry. Special moulds can be made of modelling clay, they should be used at once and the surface should be coated with soft soap before the paper is applied. Large bowl shapes either in enamelled iron, as shown at Fig. B, A, or earthenware, as at B, are quite suitable shapes for papier mâché. Small bowl shapes can be formed from basins as at C and D, Fig. C. Glass chimneys as at Fig. D are useful for moulds for serviette rings, and almost any form of flat dish or tray, as at E and F, Fig. E, can be utilised as a mould. Flat-edge tea trays of any shape or size can be made on a wooden mould as at Figs. F and G; the upper portion, which forms the inside portion of the tray, should be screwed in many places to the base to prevent warping, but moulds of wood, if they are to be used for making several trays, should be coated with shellac varnish. A mould for a pin tray can be made as at Fig. H. The inward slope of the sides should be noted; this allows the papier mâché covering as at Fig. I to be taken off the mould without difficulty.

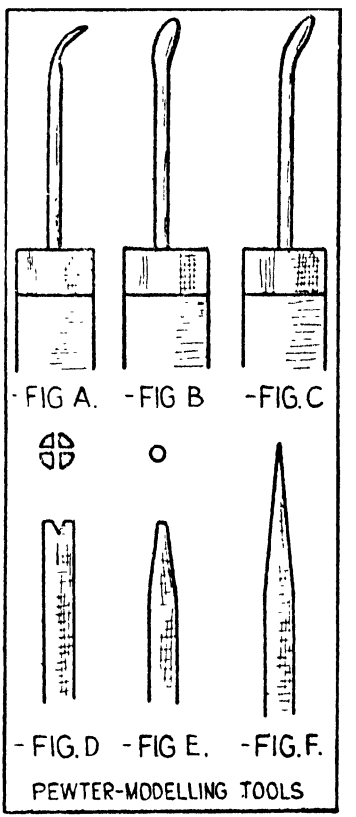
Painting and Enamelling.—Although the actual shape of the papier mâché article should be in good proportion and as decorative as possible, the finished effect mainly depends on the painting or enamelling. For plain shapes in bowls used for washing, or for trays for rough, everyday use, it will be sufficient to apply first of all one coat of ordinary white or other paint, allow it to dry and then rub it down with pumice powder. The most effective method of applying the pumice is to use a thick piece of felt, dust the pumice powder on the surface and rub with the pad. All the powder should be wiped off when the surface is quite smooth and then a coating of enamel should be applied. Do this in a warm room free from dust, apply with a soft brush and leave to dry. Use only the best-quality enamel, it goes farther and dries with a far glossier and harder surface than cheap enamels.

Excellent effects can be gained by first painting the surface with size, then with two coats of a good-quality paint. When dry rub the surface smooth with pumice powder and then apply a stencil or other decorative design in suitable colours. When dry, coat with a transparent varnish. A favourite finish for papier mâché is lacquer; this material is capable of producing brilliant effects. Outfits for amateur use are obtainable of most artists' colourmen, the lacquer itself being made in red, black, blue, cream, yellow, and white. Space will not allow of complete instructions in the art of lacquering, but sufficient directions are given with outfits to enable good effects to be obtained.

Decorative treatment on papier mâché articles is easily obtained by the use of transfers. A large variety of designs is available; they are applied without difficulty on any hard, smooth surface and they can be protected by a coat of varnish or polish.

PEWTER WORK

Art metal work has a fascination all its own, but, until the introduction of what has come to be called pewter modelling, could hardly be said to come within the category of light, easily learned, and inexpensive hobbies. To the reader seeking such, these few hints are addressed, and if in the transforming of a dingy photograph frame or hairbrush back, or the conversion of a whitewood box into a shimmering casket, pleasure and relaxation are enjoyed and something of value produced, the immediate purpose will have been served; later, if he so desires, the novice can pass on to work which is more truly art and more properly metal work. Pewter modelling is based on the assumption that beauty is only skin deep, and consists in raising designs on thin pewter (or brass or copper) sheet to be used as a covering for wooden or metal articles, such as can be found in any home or bought specially for the purpose.



PEWTER-MODELLING TOOLS

The Equipment.—The essentials are few and inexpensive, and the following will enable quite a variety of interesting work to be undertaken :

An outlining tool (Fig. A); a flat-faced modelling tool (Fig. B); a finishing tool (Fig. C); one or more punches which can be bought ready made or filed from stout nails or iron rod (that shown in Fig. D is produced by making two file-cuts at right angles); a nail driver (Fig. E); a piercer for making nail holes (Fig. F); a small penknife with pointed blade; and a small pair of scissors.

The Materials.—Pewter for modelling is sold in sheets of various thicknesses, 21 in. by 16 in., or by the pound. The thinnest is recommended for a beginning. Small round-headed nails are used for attaching the pewter, which can be brought to a brilliant polish with ordinary metal polish.

A Brooch with "Ruskin" Stone.—Fig. H shows the design for the brooch illustrated, the "Ruskin" stone being attached to centre of metal

brooch back with seccotine or similar adhesive, and showing through a hole in the pewter cut with the scissors or penknife. Having sketched the design on paper and cut out a piece of pewter with sufficient margin all round to allow of its being wrapped over edge of brooch back, place the pewter with design above it on some slightly yielding substance (the tablecloth folded over once will do), and go over the lines with a hard pencil so that they are impressed on the pewter. Remove the design and go over the lines again with the outlining tool, holding it as you would a pencil and drawing it towards you. The shaded parts are now matted with the punch, pressure with the hand or light taps with the hammer being sufficient to give the necessary impression.

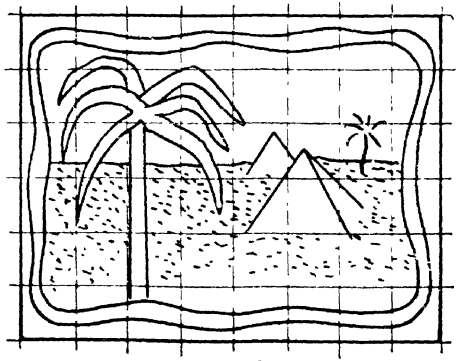
Design for Top of Box.—Details of the design illustrated are shown by Fig. G, and this is transferred to the pewter and outlined as before. Now turn the pewter over, and go round on the inside of the lines with the outlining tool; this has the effect of throwing the design up from the background. The finishing tool is used from the back or front, where necessary, and the flat-faced tool is used from the front to flatten the background, the pewter resting on a hard, flat surface, such as a sheet of glass or ordinary dinner plate, during the latter operation. The matting is done with the punch or a steel point not too sharp.

Fretted Pewter.—To the worker possessing a fretsaw and skill to use it, fret cutting in pewter will be an easy matter. The work can, however, be done with the point of a sharp penknife if thin pewter is used, and much also can be done with the scissors. Fig. I shows the simple design used for the clock case illustrated, which is of wood stained so as to show through the frets. A hole is cut in the pewter of the same size as the hole in clock case, and when the clock itself is placed in position the flange round the dial holds the pewter securely. The positions of the nails for securing remainder of front are indicated, and the outer edge of the pewter is turned neatly over and nailed at intervals.

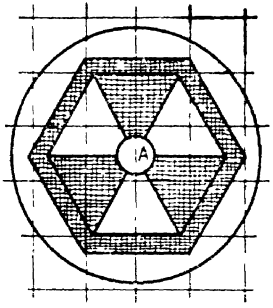
Raising Pewter Work.—One of the most fascinating operations in the working of pewter is that of "raising," and when once the method of spreading out the metal is understood, there are innumerable bowl shapes that can be adapted.

In order to be able to work deep bowl shapes in pewter, it will be necessary to gain experience in spreading out the metal on a sandbag and gradually lead up to shaping on a stake, and the suggestion given at Fig. A on the next page will be found useful. The ornament on the flat edges of the tray is given merely as indicative of the particular kind of decoration most suitable for the particular purpose in view, and can be altered to suit a round or any shape having equal sides.

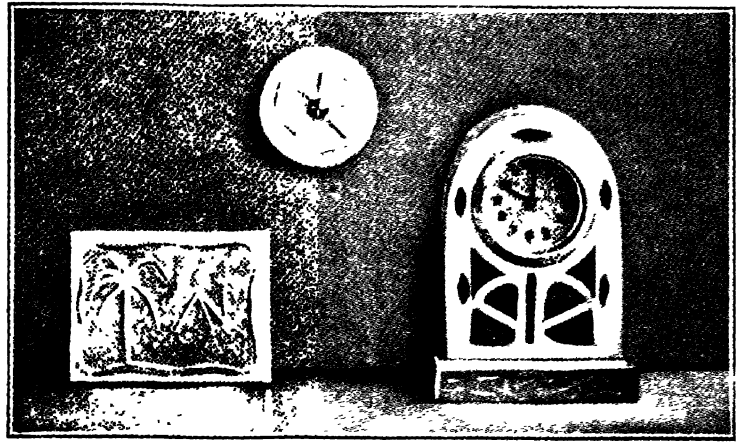
The Raising Process.—The first operation in the raising, after the shape has been cut and the edges trued up, is shown at Fig. B, the object being to depress the centre of the metal to a uniform depth as indicated in the section at Fig. C. The tools used are a small boxwood mallet

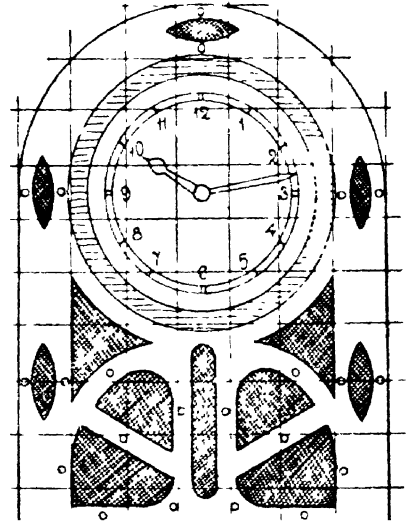


- FIG G
DESIGN FOR TOP OF BOX



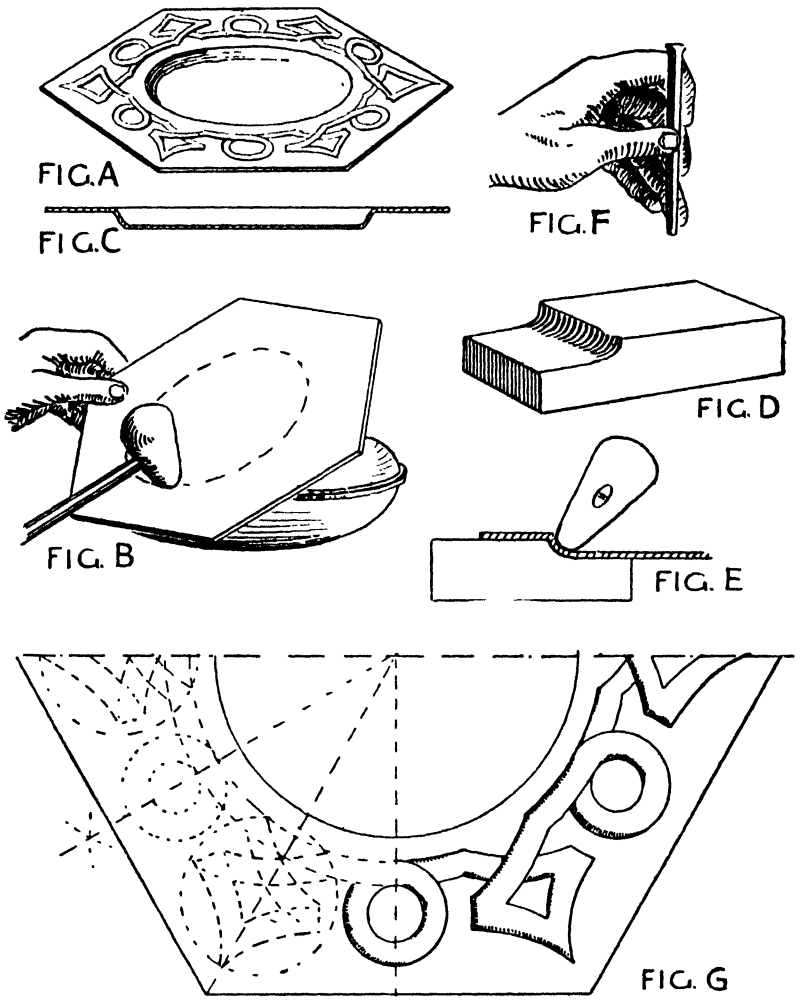
- FIG H
DESIGN FOR BROACH
A - STONE HOLE





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R1

and a leather sandbag, of 6 in. diameter. These tools are relatively cheap to buy. The latter may be made with a stout canvas covering filled with silver sand for a few pence, but either a wooden mallet as shown or a ball-faced raising hammer is essential. Horn mallets are often used,



The Raising Process in Pewter Work.

but they do not last as long as the wooden mallet, although they are a little cheaper. The metal should be from No. 18 to No. 20 s.w.g.

The piece of metal should be held firmly in the left hand so that the portion to be hit with the mallet is on the side of the sandbag. The metal is gradually turned under the repeated blows of the mallet until a continuous row of depressions or indentations has been made just inside the marked line limiting the raising. The metal is now moved inwards so

that another row of depressions can be made nearer the centre, and this is continued until the whole of the centre portion is covered. Now place the work into boiling water for a few minutes, remove and dry it and then go over it again in the same way from the outside to the centre until the correct depth is reached, annealing each time to keep the metal ductile.

It will be found difficult to keep the flat outsides of the tray quite flat, but this does not matter very much as the metal is soon flattened again by placing it face down on a piece of hard wood and lightly tapping it with the broad surface of the mallet. It should, however, be noted that any truing up must be done only with light taps, otherwise the metal will be dented.

Truing-up Methods.—The process of truing up the shape on the inside of the hollowed space is carried out on a block of wood shaped as shown at Fig. D, the depth of the hollowed portion being the same as the depth of the tray. The metal is placed in the position shown at Fig. E, so that the small end of the mallet can work into the hollow and form a clean finish to the curve. It should be noted that the tray must be moved continuously during the process so that a fresh portion of the metal is touched at each blow of the mallet.

When the edge is fairly true the whole of the inside is carefully flattened out by a series of concentric blows working to the centre, then the outside is trued up, and finally the inside of the hollow is trued up again. In cleaning up the surface, first of all it is rubbed with fine emery-cloth, the latter being used over pieces of wood shaped to the surface, and then a finish is given with a smooth paste made of whiting and water applied with a soft rag.

The pattern decided upon should now be traced or scribed on the edge outlined with a tracer held in the position shown at Fig. F, and lightly tapped with a hammer. The work is now turned face downwards and the space between the traced lines raised with a broad punch, the metal being placed on the sandbag during the process, and then the final truing up from the face with the tracer and a flat raising tool or punch is carried out while the metal is resting on a hard wood block (Fig. G).

PICTURE FRAMING (PASSE-PARTOUT METHOD)

The following description explains the use of passe-partout for a heavier class of framing than that usually associated with this material. Typical examples of such frames are shown in the two Plates.

Deep Framing Method.—Where a heavier framed effect is desired, resembling that of an ordinary wooden frame, it is possible to obtain this by using covered cardboard strips of suitable width and thickness. The strips in question are covered with passe-partout binding, as shown in the illustration. Although gluing these cardboard strips to the glass

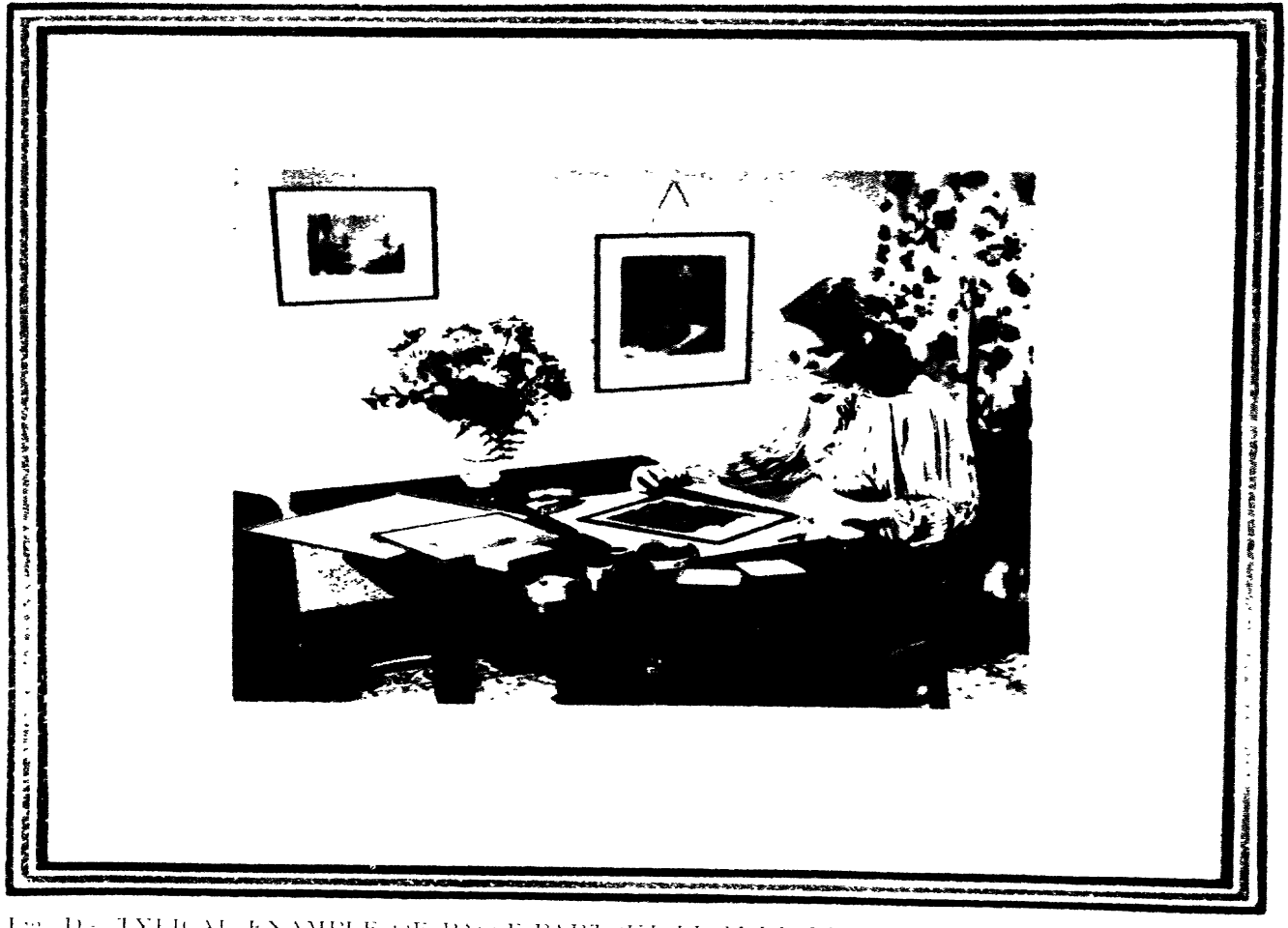


Fig. D.—TYPICAL EXAMPLE OF PASSE-PARTOUT PICTURE FRAME (*Sanderson Films, Ltd., London*)

is suggested, this is not altogether satisfactory, as the glue will not retain its hold on the glass for long. The only satisfactory method is first of all to lay a foundation strip, or strips, of the binding on to the glass, the matt surface binding being preferable, and then to glue the strips of covered cardboard down on this prepared surface; the corners of the border frames should be carefully mitred before fixing to the glass, as such heavy material cannot be cut on the glass without risk of breaking. We have seen some excellent examples of the deep frame method of binding executed by this method, the results resembling those of wooden-framed pictures, but more artistic on account of the wider choice of materials (Fig. A).

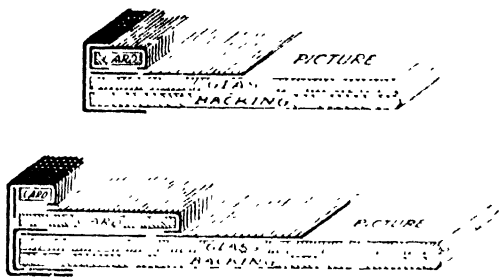


Fig. A.—Illustrating Two Methods of Deep Framing.

Variety Effects.—Some interesting variety effects may be obtained by combinations of colours of bindings, as illustrated in Figs. B and C. In this case the binding strips are laid flat on the surface of the glass, as far from the edge as necessary. For instance, if two widths are put on side by side the frame will be $1\frac{3}{4}$ in. wide, and the others can be built up with the first layer showing any required width of the inside strip, and so on, with one, two, or three colours or textures of binding. Gold strip forms an excellent inside binding. For the best effect the strip of gold shown should preferably be fairly narrow. Variety can also be obtained by sticking a piece of passe-partout laterally across the picture.



Fig. B. Fig. C.

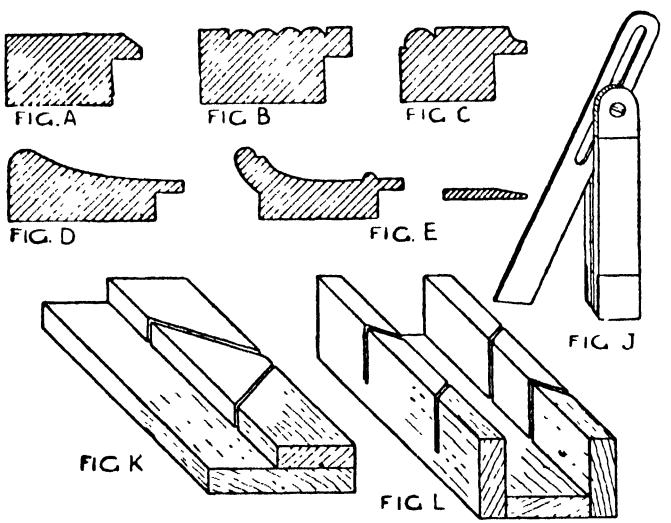
Alternative Combination Bindings.

Another effective method is to cut a piece of passe-partout at irregular intervals after gumming it to the glass so as to leave jagged edges. For silhouettes and impressionist pictures the first method offers possibilities. For circular pictures an effective result can be obtained by binding passe-partout in two or three colours around a piece of cardboard cut in the form of a circular ring. Another method is to thread any colour passe-partout through slits made in the darker portions. Still another way of obtaining a very artistic border effect is to stick triangles of light-colour passe-partout and all of the same size on to some other colour binding material.

PICTURE FRAMING (WOODEN-FRAME METHOD)

The framing of pictures means more than cutting and fitting the mitres, for consideration must be given to the most suitable form of moulding, its width, the proportions of the framework, as well as the position in which the picture is to be placed when framed.

Kinds of Frames.—Convention has more or less fixed on certain kinds of frames for different kinds of picture. The etching is generally framed in a narrow moulding, usually finished black. The water colour is framed in a narrow gilt frame, while the oil painting is usually seen in a wide decorated gilt frame. Plain frames of fumed oak are used for prints and photographs, the moulding being either quite plain, reeded, or shaped.



Some Picture Mouldings and Mitre Blocks.

Typical Mouldings.—Typical plain oak mouldings are shown at Figs. A, B, and C, and two varieties of oak spoon mouldings at Figs. D and E; the latter section shows also a slip, usually in gilt, often used with it. Prepared mouldings are generally sold in 12 ft. lengths ready for use.

It is not proposed in this article to deal with the choice of a moulding, but to explain how a framing can be made, using a plain section, as at either Figs. A, B, or C.

Size of Frame.—The first thing to do is to decide on the size of the frame, and here it is as well to note that there are three different sizes to be considered. First there is the sight size, as indicated at A and B in Fig. F. This dimension is the amount of the actual picture, or surrounding mount, that is seen; but as the rabbet into which the picture or mount is to be fitted is more or less the same in all mouldings, the important size is the rabbet size indicated by C and D. This will be the actual size of the picture or mount, the glass and the backing, as shown in the section at Fig. G, and the frame is made to whatever size this is.

Cutting the Moulding.—Supposing, then, that the picture measures 10 in. by 8 in., then the moulding should be marked out so that C and D equal these sizes as shown at Fig. H. It is understood that the corners



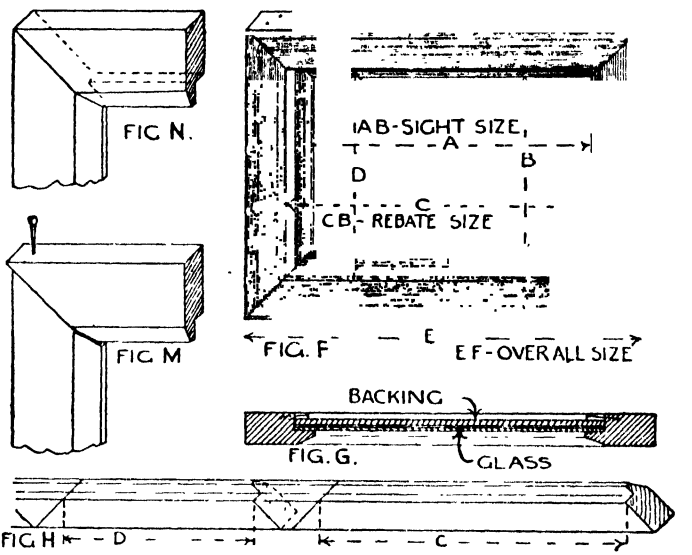
Fig. E.—AN ATTRACTIVE EIGHT-SIDED PASSE-PARTOUT FRAME



Fig. F.—EXAMPLE OF DEEP PICTURE FRAMING
(Courtesy Lewis, Ltd., London)

of the frame must be cut off at an angle of 45°; this angle may be marked off with a set-square, but the most convenient method is to use a bevel, as at Fig. J. The moulding when marked accurately to size is cut off with a fine tenon or dovetail saw, using a mitre block, two forms of which are shown at Figs. K and L. These appliances are made of beech, and must be accurate, but they are not expensive to buy. Various mechanical aids to cutting an accurate mitre are available, but with care the ordinary mitre block is quite satisfactory.

The moulding should be pressed tightly against the block and held firmly while the saw is being used, but in sawing out the opposite lengths or pairs it is as well to try the sawn length against the marks of the unsawn length before cutting, as it is most important that they should be exactly the same. With a sharp saw there should be no need to use a plane, but if one length should be a trifle longer than the other, a mitre shooting-board will be needed.



Methods of Cutting and Joining Picture Frames.

Having cut the two pairs for the frame, the side pieces in turn should be placed in the vice, the surfaces coated with glue, and the top and bottom pieces nailed to them. The nails are driven in from the top and bottom lengths, as they are less noticeable. The top piece, as shown at Fig. M, should project beyond the side piece, the amount being about $\frac{1}{8}$ in. The reason for this projection is to allow for the natural drop of the moulding as the nails are driven in the wood. When the nails are driven down, the moulding will fit tightly and square, as at Fig. N.

If the mitres have been accurately cut, the frame will be quite square and true, but nothing but accuracy will make a good frame. The fitting of the glass and the backing is quite simple, and needs no explanation. When the picture has been fitted in, the backing-board should be secured with a few brads, and the whole of the back of the frame covered with brown paper pasted on to exclude dust.

An Economical Method.—For amateur woodworkers who have not yet got the proper tools for framing pictures in mouldings—chiefly the mitre shooting-plane and board; or find difficulty in making mitred

joints; or have not got the mouldings to mitre—there are some other ways of framing moderate-size pictures, which might serve their purpose without incurring any cost worth considering. It is quite elementary work to make good halved joints in slips of soft deal, $\frac{3}{4}$ in. by $\frac{3}{8}$ in. in section. So to make frames any size up to about 18 in. by 14 in. with four such joints, glued and pinned as shown by the accompanying drawing (Fig. N), is but light, easy work. The frames should be straight, true, and neat and be faced with slips of oak-veneered mount board, 1 in. wide, mitred at the corners and fixed with glue, as in Fig. O. They will need to be trimmed up smooth with No. 1 glass-paper, and stained with a little aniline walnut stain powder dissolved in methylated spirit, applied lightly with a small camel-hair brush. When dry it is again smoothed over with very fine worn glass-paper, and a little raw linseed oil well rubbed in with a soft rag; then hung up for the light and air to dry it. After a week, or longer, it may be given another oil treatment if desired to improve it. Or it may be brushed over lightly with ordinary brown french-polish solution. This soon dries, and may be smoothed over with the fine worn glass-paper.

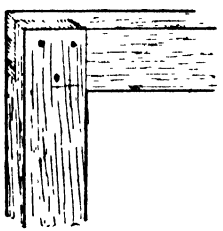


Fig. N.
Simple Glued and Pinned Joint.

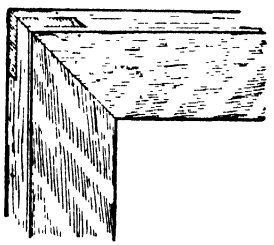
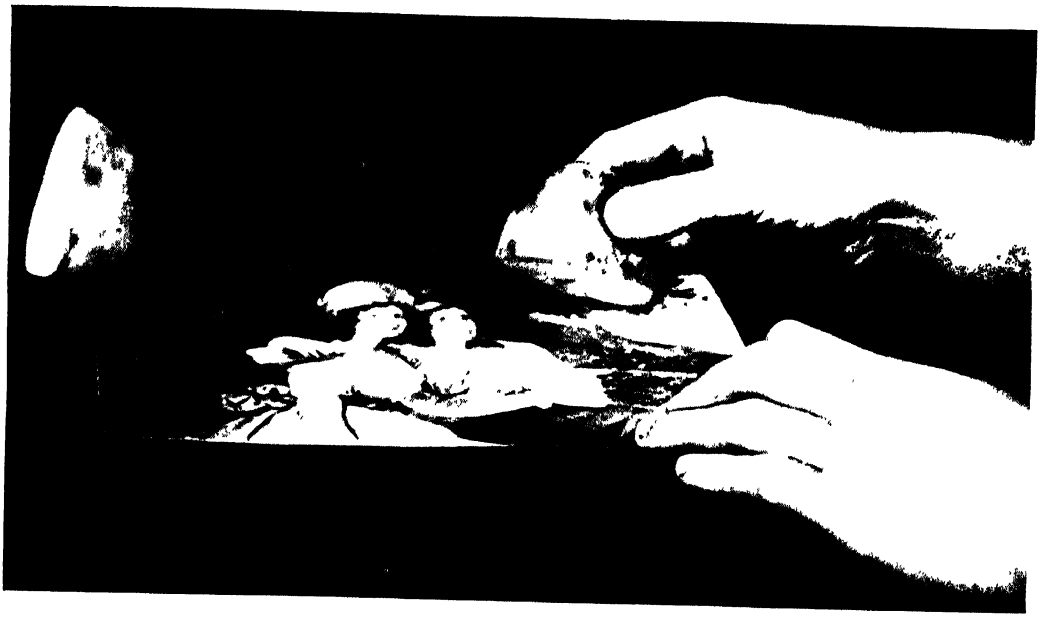


Fig. O.
Mitred and Glued Joint.

The Rabbet.—The frame rabbet could be fitted with gilt slips, or a substitute for same, strips of gold mount board $\frac{1}{2}$ in. or $\frac{3}{4}$ in. wide. These may be inside or outside the glass. For a picture only, they are best outside; for a cut-out mounted picture they could be inside. The framed picture will require backing in the usual way with thin wood board, strawboard, or stiff cardboard, covered with strong brown paper to keep dust-proof.

Backing the Picture.—The right, expedient way to back a picture is to see that the backing is evenly pressed in, retained with the right kind of sharp-pointed square-cut brads, driven in on the slant as near to each other as may be necessary to keep the picture or mount from waving. The brown paper, about $\frac{1}{2}$ in. larger all round, should be damped evenly all over with a sponge and clean water; then the back surface of the frame is quickly stroked over with glue, the rough side of the paper laid on and rubbed down close, to be trimmed off when dry. Larger frames have been made on this principle, faced with oak, walnut, mahogany, rosewood, etc., having beading slips covering the outer deal surfaces; and sometimes inlaid with lines and bandings, polish-finished to show the beauty of the wood. These, of course, are special work, and the joints of such frames cannot come apart.

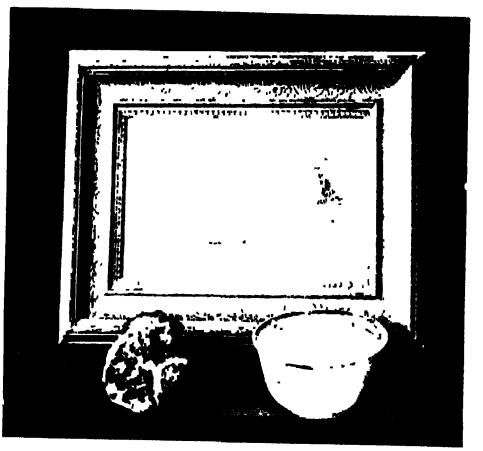
Photo Frames.—Small photo frames can be made by facing the wood with the inlay bandings used in cabinet making, such as the cross-band tulip-wood, satin-wood, grey-wood with ebony lines, etc.



Stains can be removed from Prints with a Cut Potato applied gently to the Surface



Varnish is removed with a Cloth dipped in Transparent Grade Methylated Spirits, using another Cloth saturated with Turps and Oil to check over-action of the Spirits



Oil paintings can be cleaned with Warm Water and a Soft Grade of Sponge. The Natural Type of Sponge is used in preference to the Artificial

PICTURE RESTORING.

PICTURE RESTORING

Many a valuable picture could be restored to its original beauty and brilliance by careful cleaning. However well cared for, pictures become begrimed with dirt that may be imperceptible until at a certain date the dull appearance of the print strikes one suddenly. As a rule the glass is carefully wiped and rubbed, the frame kept clean, and the exterior of the picture never allowed to become dirty or shabby; but this does not touch the print, which receives hardly any attention, due perhaps to a disinclination to interfere with and perhaps spoil it. This need not be, however, for anyone with common sense and a careful hand may undertake an occasional renovation of any kind of picture by removing the print and subjecting it to a suitable cleaning process.

Prints.—The most dirty print can be at least passably renovated by quite simple and everyday means and methods, but it is useless to attempt to put new life into a print that is past revival; if the print is limp and lifeless when taken from the frame it may be judged to be past redemption, for it should be stiff and possess a healthy rustle in the hands. To attempt to clean a print of this kind will probably result in the picture being removed as well as the dirt.

As a rule, chlorate of soda will be found the best medium wherewith to clean an ordinary print. The liquid must be diluted well, used sparingly, and with very light rubbing. Before this is done, it is as well to try to remove local stains or blemishes. Grease, for instance, will yield to petrol; inkstains to salts of lemon; minor defects can be removed by a gently rubbing with a piece of bread or indiarubber. These processes may leave dull or light pieces on the print. For example, inkstains removed by a strong agent like salts of lemon will probably leave a patch of discoloration; this can be remedied by the application of a little weak tea. White of egg will also restore any faded colours that may occur through drastic cleaning treatment.

Varnished Pictures.—If the picture is varnished, all that is required will probably be removal of dirt from the varnish film; but if the picture is dirty under the varnish the latter must be removed, which can be done with the use of a rag in each hand—one moistened with methylated spirit to remove the varnish, and the other dipped in turps and oil for using in case the spirit does its work too thoroughly and thus check its action. It will be seen that varnish removal is not an amateur's job, and had best be left alone by anyone that does not thoroughly understand what is being done.

Varnished pictures, as a rule, can be satisfactorily cleaned without recourse to such extreme measures. A sponge and warm water usually have the desired effect on a varnished oil painting. It must be done very carefully, however. Apply the sponge, well wrung out, gently at one small spot, and then dry the place quickly with some soft material such as silk. The painting must not be made generally moist. The removal

of any stains is usually the work of an expert, but stains that are not exceptional may be removed by means of half a raw potato applied gently and persistently.

Water Colours.—Water colours that have been varnished can be cleaned by immersion in a bath of ammonia water; but here again the safest course is to let the expert deal with the picture.

All prints subjected to treatment by liquid must be well dried before putting back into their frames; and during the drying the prints are best mounted or well pressed. The print can be laid between sheets of blotting paper and placed between two heavy books, or in any kind of press that may be available.

PORCELAIN, MENDING OF

When a porcelain mortar is broken, it is usually looked upon as useless, but with the aid of shellac it can be repaired so satisfactorily as to be of use for light work. Warm the porcelain slightly, and apply the shellac to the broken edges. Now bind with adhesive tape and leave to dry for at least a day before using.

POUFFES, HOW TO MAKE THEM

The materials for making pouffes may sometimes be collected from about the house. For instance, four excellent pouffes were made from a long wall-cushion that had previously served with a corner seat of a billiard-room. The tapestry was of good quality; also, the strong lining and the filling of curled horse-hair the best for the purpose.

Others have been made, using the curtains and drapery of old wood bedsteads that have been altered to the present-day style. These are often quite strong and durable even after years of service. Some of them make handsome upholstery.

A Medium-grade Pouffe.—Besides, there are often odd pieces of new stuff that can be used up to advantage on pouffes; and many attractive remnants that are quite suitable may be bought at the shops.

An average kind of pouffe is shown by the upper photograph of Plate facing this page. It is 9 in. in height by 18 in. diameter.

To make this requires two pieces of strong lining stuff 16 in. diameter, and a piece 48 in. long by 11 in. wide. These are seamed together inside out to form the case, the border seam being left open to turn the stuff right side out. It may then be evenly stuffed with 8 lb. of wool flock, and the opening sewn up. When this is done, the cushion requires some beating into better shape, and a length of strong twine is slip-knotted round the waist, drawn in tight, to form the sectional division. Thus the plain pouffe is made, ready for the finishing cover.

The Detachable Cover.—This cover consists of a piece of plain velvet and a piece of strong tapestry, both 25 in. square; to be seamed together inside out, leaving one edge unsewn for turning right side out;



A Common Type of Pouffe



Pouffe with Loose Cover.

POUFFES.

to be drawn over the pouffe, the opening being then sewn up. The seamed edges must be pressed in between the sections, except the corners, which must be left out as lug handles. To retain these, a slip-knotted cord must be drawn tight round twice, over and under the lugs; to be covered by a length of upholstery rope fixed round the same way, the ends being stitched together. This completes the pouffe, and it may be taken as a standard to reckon by, in making others of different sizes; and, of course, of different degrees of excellence according to the room and furniture they have to accompany.

For instance, for an elegantly furnished drawing-room, a pouffe may be filled with white curled horse-hair and down, in down-proof case, upholstered in rich silk tapestry or embroidery.

A Good Cheap Pouffe with Loose Cover.—To make a pouffe at little or no cost, the case may be of any available material, stuffed with the wood fibre that has been used for packing fancy goods, confectionery, eggs, and such-like.

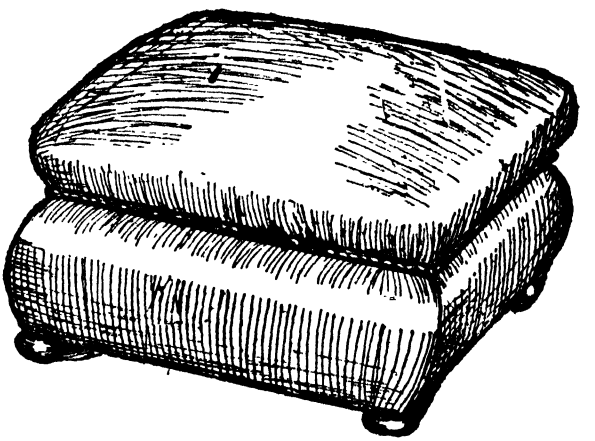


Fig. A.—Box Pouffe with Wooden Framework.

The finishing cover may be of some cheap material. The lower photograph in Plate facing page 156, shows one that is quite useful. The simple cover is of cretonne, cut to 40 in. diameter, hemmed on the circular edge, and a running string through it. It is placed over and drawn in on the under side of the pouffe, then corded and roped round the waist, the upholstery rope being looped to form two handles. This kind of cover can be the more easily taken off for cleaning. In fact, it is a clean, light pouffe in every way, and quite serviceable.

A Box Pouffe.—A useful pouffe of the box variety, as a slipper ottoman, is a convenient home comfort; most acceptable as a present; especially with a pair of slippers inside. To make a box pouffe will be an interesting bit of handiwork; see the accompanying drawings, Figs. A and B.

The box may be 12 in. square inside, by 5 in. deep, of wood ½ in. thick; deal, packing-case stuff will do, as it is to be lined inside and covered outside.

When the four side pieces are cut for the box sides they may be covered on the inner side with pieces of leather-cloth, which may be fixed with tacks or glued on the lower edge; but lap over the upper edge about an inch on the outer side. Then they can be fixed together by fine 2 in.

wire nails. The bottom is next covered and nailed on with 1½ in. nails. The lid will be a board of ½ in. thickness, 1 ft. 1 in. square; but requires two battens 1 ft. 1 in. by 1½ in. by ¾ in. nailing across flush with the end-grain edges on the upper side; then two more batten pieces on the other edges, which will be about 10 in. long. That is to strengthen the lid and retain the stuffing. The under side is covered with the leather-cloth lapped on to the edges; and the lid may be hinged in place by a doubled strip of the leather-cloth glued and tacked along the back edge; further supported by a strip of webbing. It is now ready for the upholstery work

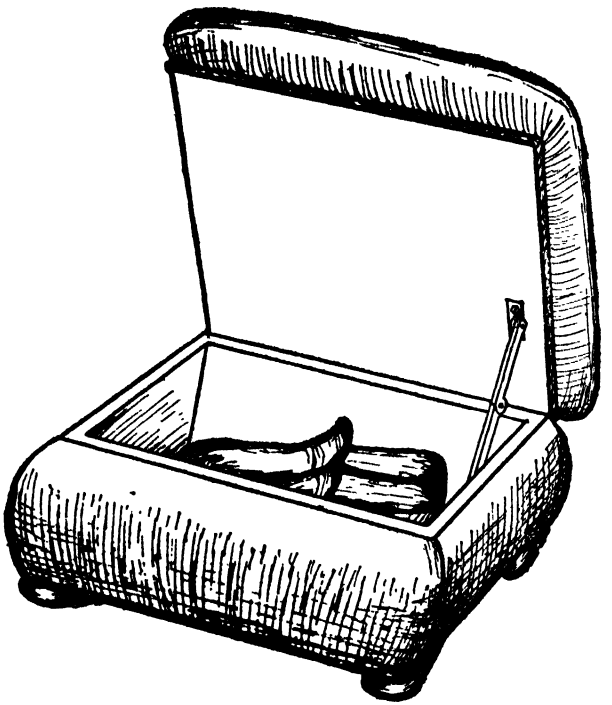


Fig. B.—Box Pouffe, Showing how the Lid is Held Open.

Upholstering the Box Pouffe.—The covering material may be of velvet, moquette, tapestry, or damask. For the box sides, four pieces are required 16 in. by 7½ in., the ends being cut slightly curved. These are to be back tacked ½ in. on at the upper edges, with a strip of thin, stiff cardboard, then drawn over a padding of flock and wadding to be tacked 1 in. on to the bottom. The corners have to be turned in and stitched up invisibly with suitable thread.

For the lid a stuffed roll is formed of flock in canvas 1½ in. diameter, on the four edges; the inner part being then filled in, wadded and covered, turning in the edges of the stuff. The tacked edges of the box lid are hidden by a length of upholstery cord fixed with gimp pins. A brass arm stay is fitted to keep the lid in position when open.

The box bottom is covered with a piece of leather-cloth, the edges being turned in and neatly tacked. A set of four bun-shaped feet of turned wood is fixed each with a screw, and a set of gliders put on, so that the pouffe can be pushed about a floor or carpet without noise or wear.

PRINTING PRESS, FOR HOME USE

A good printing press would be a boon to many amateurs to do odd jobs, such as printing dance tickets, visiting cards, notices, etc., when these are not of sufficient number to justify giving them to the local printer.

It is almost entirely constructed of ½ in. thick yellow pine. In selecting the wood, see that it has been well seasoned, and has no tendency to warp, since this would be fatal to the smooth working of the machine. Finally, the material should all be planed square and true before starting to piece it together.

General Lay-out.—All is now ready for making the press. A glance at Fig. A will show the general lay-out. The right-hand box is the case for holding the type, and the left-hand table is for taking the ink. On lifting the platen, the roller rolls over the ink, which it takes up and transfers to the type face. Bearing this principle in mind, the actual making should be easy. The baseboard measures 25 in. long, by 9 in. broad, by ½ in. thick, and is bevelled at both ends, so that the top

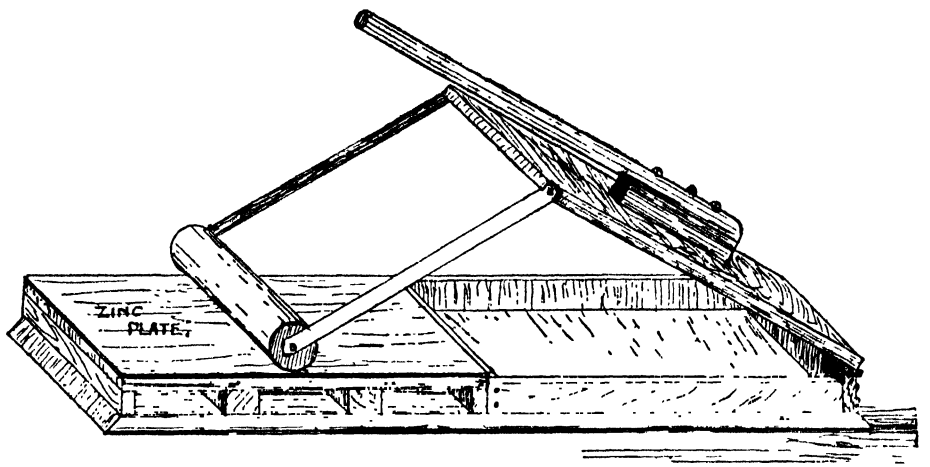


Fig. A.—Showing the Completed Printing Press.

measures 24 in. by 9 in. The end piece is 9 in. long by ½ in. thick, and should be just under 1¼ in. deep. It should be fixed at one end of the base by means of wood screws. Now, cut two pieces of wood, 1 in. deep by ½ in. thick and 15½ in. long. These are to form the sides of the case, and should be fixed to the base in a similar manner. To complete the box, the last side should be put in. It measures 8½ in. by 1 in. by ½ in., and is simply held in position by means of screws, as shown in Fig. B.

The Ink Plate.—Attention should now be given to the ink plate. It consists of a ½ in. board, 12 in. long by 9 in. broad, with a thin zinc plate fixed to the top so as to hold the ink. It is supported in the manner shown in Figs. A and B by means of wood blocks ¾ in. high, thus making the zinc plate stand 1¼ in. above the baseboard. The reason for this will be evident later.

The Platen.—The platen should now be tackled. It consists of a board of ¾ in. beech, or other hard wood, 12 in. long and 9 in. broad.

In the centre of this is screwed a block of pine, 4 in. long and $1\frac{1}{2}$ in. broad by 1 in. deep. On to this block is screwed a long handle, 14 in. by $\frac{3}{4}$ in. Two brass strips, $10\frac{1}{4}$ in. long and $\frac{3}{4}$ in. broad, are next obtained. One end is screwed loosely to the platen, in the manner shown, and the other end has a hole bored in it, $\frac{1}{8}$ in. diameter, to take the roller. This roller is 9 in. long and $1\frac{1}{2}$ in. in diameter, and is turned out of wood. Down the centre of it a hole $\frac{3}{4}$ in. diameter is bored, and a lead rod of the same diameter and length driven in. This is to load the roller. An $\frac{1}{8}$ in. spindle (Meccano) should be fitted through the lead core and on to the brass strips. Finally, the roller must be covered with rubber. An old inner tube off a bicycle would do very well, and this should be glued to the roller. All that remains to be done now is to hinge the

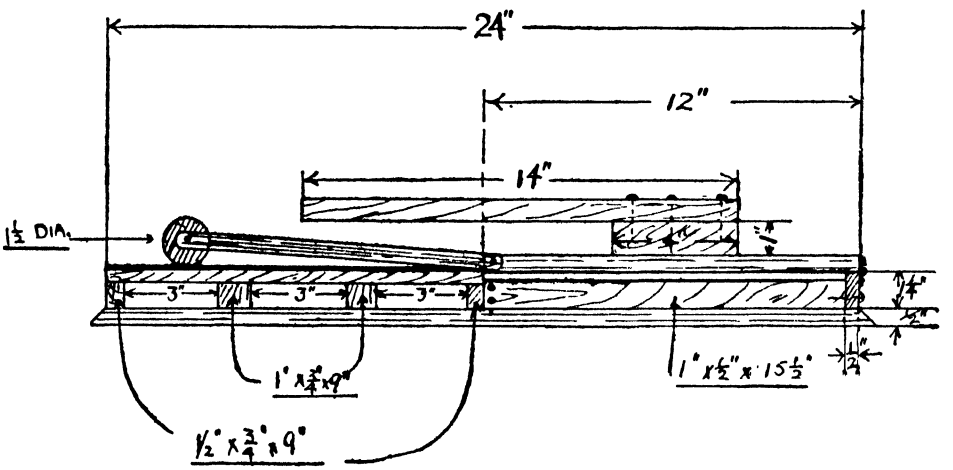


Fig. B.—Construction and Dimensions of the Press.

platen to the body of the machine. Before doing this get some type from a printer, and set up one or two in each corner of the case. It is designed for type exactly $1\frac{1}{4}$ in. long, so that when the platen is laid on it, the right-hand end just clears the end piece of the case. (See Fig. A.) When in this position, the hinges should be fitted, thus making sure that the platen will press evenly all over the surface of the type.

Wood Frame.—This consists of strips of wood of varying lengths and thicknesses, and all 1 in. deep. A convenient size would be $\frac{1}{4}$ in. thick by $8\frac{1}{2}$ in. long. It is used to pack up the space where there is no type, as well as to form a support for the type itself. If it is possible, the amateur would be well advised to fit a long wooden screw through the right-hand end of the case, and working against an $8\frac{1}{2}$ in. piece of furniture, so that type and furniture can be screwed rigidly together. This completes the machine, and it is now ready for printing.

Ordinary printer's type $\frac{11}{16}$ in. high can be used. A fount of "long primer" is suggested as a suitable type to employ.

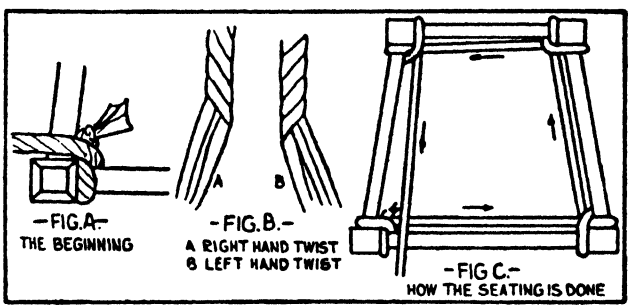
Requisites, such as ink, can also be obtained from a printing establishment.

Printing.—The actual printing is simple. A piece of paper is first fixed to the platen with drawing pins, the plate inked, and a copy made. Large drawing pins should now be pressed into each corner of the printed matter, so that the card or paper to be printed on, when slipped in, exactly superimposes on the first one. This ensures everything being in correct register, and in this way any number of copies may be drawn off.

RUSH SEATING FOR CHAIRS

The following notes will assist the amateur wishing to construct or repair rush-seated chairs.

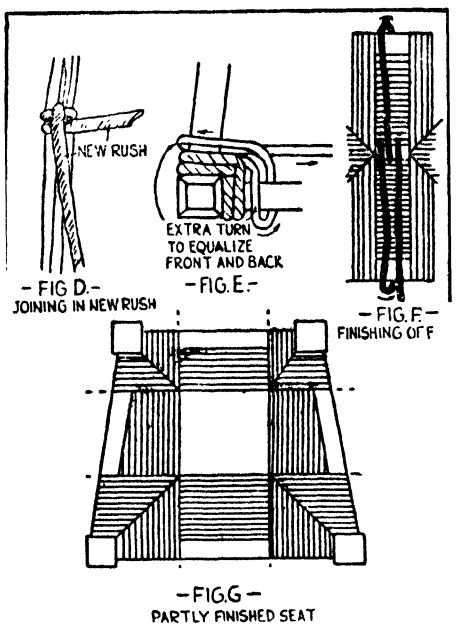
The best kind of rush is that known as "salt-water" and to render it pliable it should be immersed in water for two or three minutes and then be allowed to lie for a time before being used. It can be kept in good working condition for several days by being covered with a damp cloth when not in use. Rush seats usually have wood slats to protect the edges, and these are first carefully removed with a view to their replacement when the seat has been re-rushed. Then the old rush is cut away and destroyed, and after the seat has been dusted it is ready for the new rush.



Some Details of Rush Seating Work.

Twisting the Rushes.—First draw out three rushes from the bundle and knot the butt ends together. Place this knot in the position shown in Fig. A and then twist the three rushes together in a clockwise direction as at A (Fig. B), taking the twist round under rail, up on the inside, and over to the left, thus gripping the knot securely. Now twist the rushes in the opposite direction—that is to say, to the left as at B (Fig. B). The twist is reversed each time, a simple enough matter if worker bears in mind always to twist away from the corner and towards the centre of rail. Reference to Fig. C will show that the rushes are now taken right across seat to the right-hand corner, this being treated in a similar manner to the left-hand corner, then across to back, and so on, right round the seat. Essentially, rush seating consists simply of this round and round binding, the square at each corner gradually increasing till the four meet in centre of seat. The rushes need be twisted only at the parts which will be in sight in the finished seat, and also round edge of seat, but the under side should be made as neat as possible by tucking in all surplus ends as the work proceeds. At frequent intervals new rushes must be added, and this is accomplished as shown in Fig. D, the join

coming underneath the seat. In the unlikely event of the seats being absolutely square, the filling in can proceed in a regular manner till centre is reached; but if the seats are wider in front than at the back extra turns must be taken at the two front corners, as shown in Fig. E, these being put in at intervals until the width of the work at back and front is equalised. The two sides of seat will also be equal one with the other, but it is not necessary that the sides should measure the same as the back and front, because if either the sides or the back and front fill up first, the remaining space is filled in by means of "figure-of-eight" working, as shown in Fig. F. When nearing the finish a large packing-needle pushed down from top to draw up the rush is very useful. Having quite filled the seat, the remaining end is pushed in underneath and will be held securely by the stuffing.



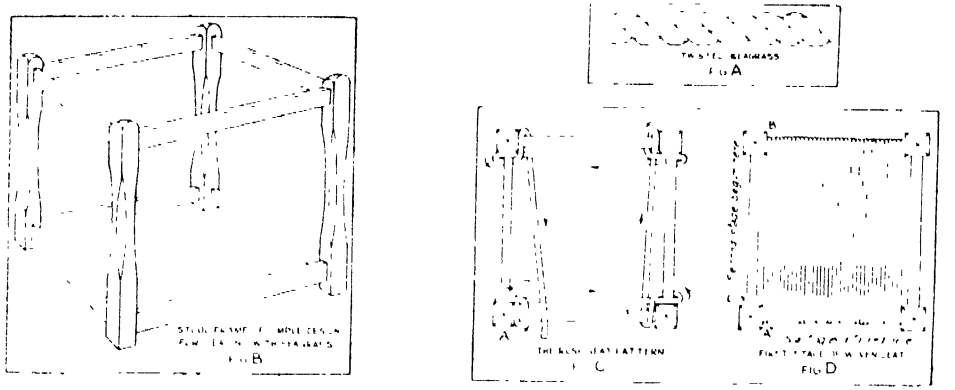
Further Details of Rush Seating Methods.

Stuffing the Seat.—For stuffing the seat, pieces of rush are folded up into loose balls and packed in just above the bottom layer, each one being pushed well towards the corner with a piece of wood having a blunt point. Rush seating is not one of the simplest of operations, although quite within the scope of the amateur after a little practice. Perhaps the two most important points to be borne in mind are (1) to keep an even tension throughout the seat, not getting one strand tight and the next one loose; and (2) whatever the shape of seat may be, to get as soon as possible, and afterwards maintain, straight lines and right angles in the work as shown in Fig. G.

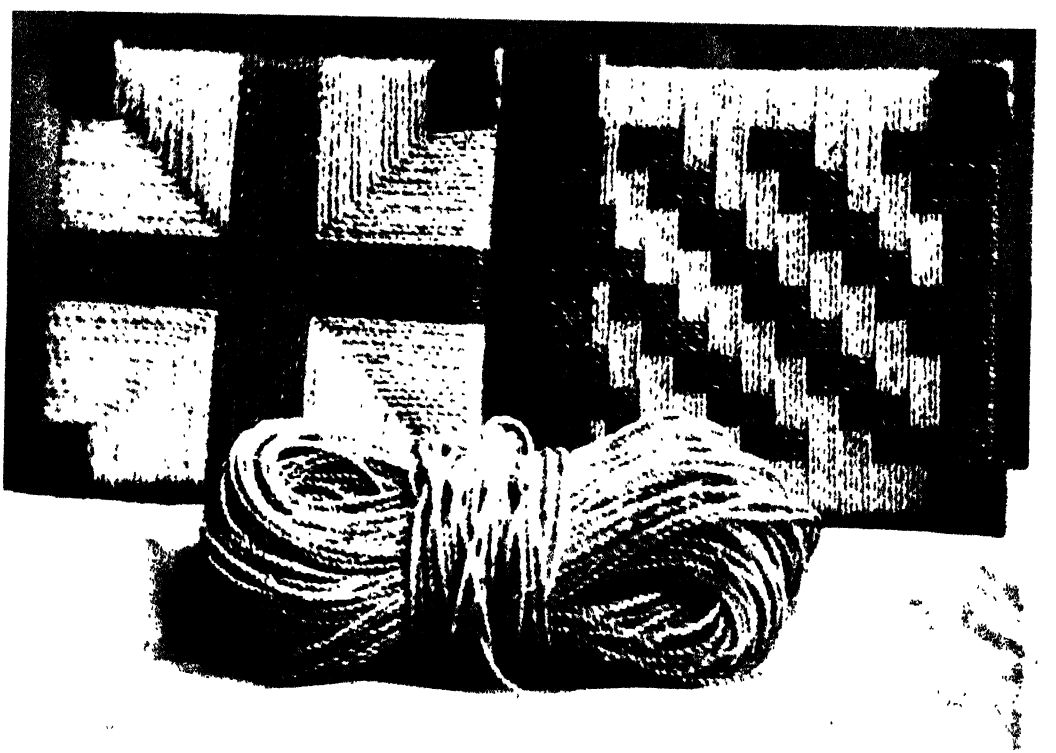
SEAGRASS STOOL SEATING

One of the most popular homecrafts is the seating of ready-made stool or chair frames with seagrass. It provides plenty of scope for introducing colour combinations where these are appropriate, and the pattern or design formed by the weaving can be varied almost indefinitely. The one serious drawback to the method is the comparative roughness of the seat due to the fact that the seagrass cord is made up of two twists running opposite to each other. To get a smoother seat some workers use string or thin cord worked in exactly the same way.

The Material.—Seagrass, a kind of sedge growing in India and China, is sold by cane merchants and handicraft material suppliers. It is ready



Seagrass Stool Seating



Illustrating the use of Seagrass for making Stool and Chair Seat.

SEAGRASS STOOL AND CHAIR SEATING

twisted into continuous lengths and can be had in three thicknesses, the thinnest being recommended for woven seats, and the medium and thick for seats worked in the same manner as a rush seat (see left-hand example in photograph). About a pound will be required for a seat of moderate size. Seagrass needs no preparation for working, but may advantageously be cut into lengths of about 6 yards, one length being joined to another by means of a reef knot underneath the seat. Fig. A on Plate facing page 162 shows a piece of the material, and a bundle of it is shown.

The Frames.—These can be bought from the firms who supply the seagrass, but any woodworker can make his own without difficulty. Fig. B shows a very simple design, the dimensions being 12 in. by 12 in. by 11½ in. high, overall measurements. Chair frames can be bought or made also, the seat rails and front corners (unless the chairs has arms) being similar to those of the stool frame illustrated.

The Rush Seat Pattern.—Begin at left-hand front corner (A, Fig. C) by placing the end of seagrass on top of rail close up to corner piece. Pass seagrass under front rail, up on the inside, and over the left-hand rail, then continue round the seat as indicated by arrows in Fig. C. The completed seat is shown on left of photograph, a second colour having been introduced to give variety. Three or even more colours could be used if desired.

A Woven Seat.—A simple woven seat in two colours is shown on right of photograph, natural seagrass having been used for the first stage (the vertical strands) and red for the second stage (the " side to side " strands). Begin by tying a knot at end of seagrass and tacking this to under side of rail close up to left-hand front corner (A, Fig. D). Now bring seagrass over the back corner (B, Fig. D), round rail to under side, and back underneath seat to starting-point. Continue in this way, binding the seat round and round until it is completely filled with vertical strands close together as shown by Fig. D. Fasten off end by tacking to under side of rail. For weaving in the second stage a large bent packing-needle with point somewhat blunted should be used. Thread this with a length of coloured seagrass and tack the other end of the seagrass to under side of rail at C, Fig. D. Each strand is worked singly and passes over six and under six of the vertical strands, returning underneath seat to left-hand side to begin the next row. After six strands or rows have been woven in, the weaving is changed as will be seen by the photograph. The under side of seat can be woven in the same manner as the top, but this is not really necessary although some weaving should be done underneath for the sake of neatness. When back of seat is reached the end of seagrass is tacked to under side of rail as at the beginning.

SPECTACLE REPAIRING

The following notes on a job actually carried out may be welcome to those who wish to effect a similar temporary repair.

The lens was fractured where the side frame of the spectacle fitted (a usual place for a fracture), so a piece of aluminium was filed to shape to

replace the missing portion of the lens. Then, two holes were drilled through this piece of aluminium.

The next operation proved rather a delicate one, drilling two holes through the lens. This was done by means of a watchmaker's hardened steel drill, used very slowly and carefully. A jeweller's fine steel graver may be used instead, but in either case cutting is facilitated by using a drop of turpentine.

To complete the repair thin copper wire was threaded through the two pairs of holes, pulling tightly to clamp together the lens and the aluminium, finally binding and securing this wire by sweating solder in the coils.

A large hole was then drilled in the middle of the aluminium to accommodate the screw for securing the side frame of the spectacles.

STAINED GLASS, IMITATION, TO AFFIX AND REMOVE

When imitation stained glass or window transparencies were first introduced they were supplied in sheets and were very expensive. Now they may be obtained in a large variety of patterns and are supplied in rolls like wall-paper at a very moderate price. The method of affixing is simple, although it requires care and patience. The glass must be made perfectly clean. After washing with soda or ammonia and water, followed by clean water, the surface should be rubbed over with a little whiting. The transparency should be cut to exactly fit the position it is to occupy. If the measurement is too short, a space will show and the good effect be lost. The sheet should be thoroughly wetted on the side which is most glossy and then pressed down upon the glass evenly so as to avoid bubbles. It is of advantage if the glass itself is wetted, a very little Russian glue being added. A cloth may be used to press the material to the glass, but the best tool to use is a small indiarubber roller such as may be obtained at any photographic supplies shop.

If there are any obstinate air bubbles, the best way to get rid of them is to prick them with a fine needle.

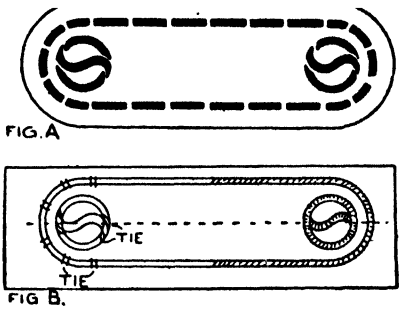
To remove old transparencies apply a solution of very hot soda and water, allow it to soak in and then scrape off with a cold chisel. An excellent tool for the purpose is made by fitting up an old safety razor blade with a suitable handle.

STENCILLING

The beginner will be well advised to begin with something easy, not only in regard to the design, but to the cutting and brushwork as well, and therefore a suggestion is given in Fig. A for a stencilled finger-plate; the design can be used for other purposes, and would form a good decoration for a linen runner for a table providing it were drawn to a larger scale.

As the success of the stencil plate, that is the perforated paper or metal, depends on the presence of " ties " which hold the various parts of the design together, the provision of these important parts of the design must

be carefully considered. A working drawing for the finger-plate design is shown in Fig. B, and it will be seen that if the shaded portion on the left-hand side of the drawing were cut out, the whole of the inner portion would fall away. To prevent this, and keep the inner portion of the design in its place, narrow strips of the paper must be left. As these ties are thus an essential portion of the stencil, they should, as far as possible, be incorporated in the design.

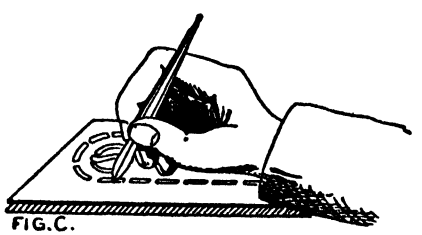


Stencil Marking, Showing " Ties."

The paper used for cutting stencils should be of good quality; cartridge drawing-paper is commonly used, but specially prepared stencil paper can be obtained.

Stencil Cutting.—It is important to cut the edges of the paper very clean; this requires the use of a sharp knife and a sheet of thick glass for a cutting surface. An ordinary penknife can be used, but a proper stencil-cutting knife is more convenient to hold. The point of the knife only is used for cutting, and to keep it perfectly sharp a fine-grained oilstone should be close at hand, as it will be used very frequently. Instead of an oilstone, a strip of finest emery-cloth, glued to a strip of wood, can be used, and a strip of leather similarly mounted will be found useful in imparting a keen edge.

The method of holding the knife in cutting out the stencil is shown at Fig. C; for lengths of straight line, a ruler can be used to guide the knife, but all curved lines must be cut freehand; it is better to get into the habit of cutting all lines without mechanical aids. As a general rule it is safer to cut away from the tie as far as possible, but always when approaching a tie great care should be taken in completing the cut. When all the small pieces of paper have been cut away the stencil can be prepared for use by brushing it over with shellac varnish or linseed oil, but with the latter material the paper must be left for a day or two for the oil to harden. If one colour only is going to be used, the varnishing need not be done, but a stencil will last much longer if so treated.



Method of Using the Stencil Knife.

Using the Stencil Brush.—Special brushes are used for stencilling, the most commonly used type being shown at Fig. D. The handle should be short and the brush composed of bristles about ½ in. long. The paint used depends on the particular materials to be stencilled, and also the treatment the material has received. When stencilling wood the porous nature of the material should be noted. Fairly thick paint, either oil or water colour, can be used, but with oil colour the edges are likely to run unless the wood has been sized or varnished. If the wooden shapes are

cut out of white wood, a good effect is produced by mixing some oil paint with varnish, or using an enamel paint, stencilling the paint on, and when dry coating the whole of the surface with ebony stain. The paint should be thick and spread on a tile, a piece of slate or glass. The brush should be dabbed on the paint, and then dabbed on the stencil plate, keeping the handle upright so that the surface of the bristles are flat on the work. Care must be taken to keep the paper close to the work, and no movement should be allowed while the paint is being applied. When the stencilling is finished, the end of the paper should be lifted up as at Fig. E, care being taken to avoid smudging any of the paint underneath.

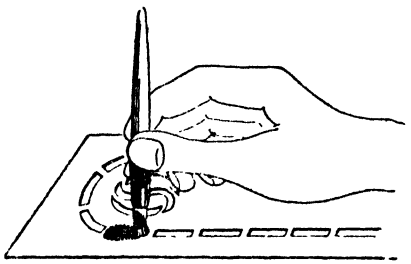


Fig. D.—Using the Stencil Brush.

Useful Hints.—Both the stencil plate and the brush should be cleaned as soon as possible after use; turpentine is the best medium to use. If the stencil is required again, wipe it quite dry and keep flat in an envelope or otherwise secure from damage. Two or more colours can be done with the same stencil plate, but it will be necessary, when the colours are fairly close together, to cover the portions not to be touched with suitable strips of paper. When possible, it is better to use two stencil plates when two colours are needed, but in this case some registering device must be used in order to apply the stencil plate in the correct position each time; this can be done by cutting out portions of the design in places remote from the second colour.

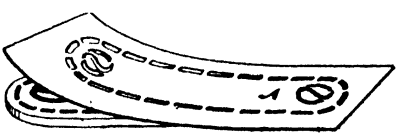


Fig. E.—Removing Stencil from the Finished Work.

TABLET WEAVING

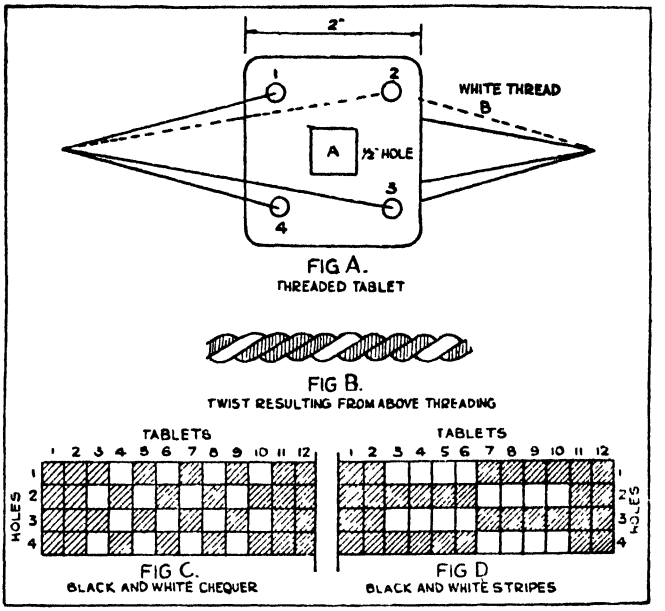
Differing in principle from ordinary loom weaving, the peculiar fascination of tablet weaving lies in the variety of simple patterns that can be obtained, the result depending not on the skill and close attention of the weaver, but almost entirely on the preliminary threading of the tablets.

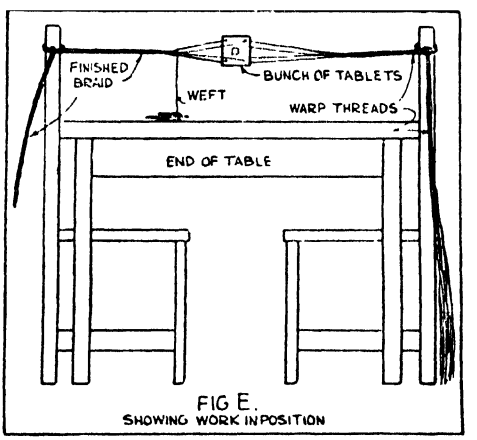
The Equipment.—Fig. A shows one of the tablets, which are made from thin, smooth wood or, best of all, celluloid. Four round holes are provided, one at each corner, and a hole ½ in. square in the centre to enable each tablet to be passed on to a piece of square stripwood as it is threaded so as to keep in correct position till weaving is begun, when the wood must be removed. The tablet in Fig. A is shown threaded with three black threads and one white one and, assuming that a number of tablets each threaded in the same way are placed together and weaving proceeded with, the resulting braid will have a transverse band of white recurring at regular intervals. Reference to Fig. B, which shows how the white thread comes to the surface every fourth time, will help to make the process clear. Some

sort of shuttle will be needed to hold the weft thread; a narrow strip of stout card or thin wood having a curved notch at each end is suitable, the thread being wound round and round lengthwise. For beating up the work a paper-knife or some similar blunt-edged implement is used.

The Materials.— Stout, well-twisted mercerised cotton is a good material for the warp, while for the weft, which is of minor importance, any kind of strong thread somewhat thinner than the warp can be used.

How the Weaving is Performed.— Twelve tablets is a good number for a beginning and these are represented in Fig. C by the twelve sets of four squares corresponding to the width of the braid. Assuming that black and white threads are to be used (though the reader will not be long in realising the enormous possibilities of colour variations), the first two tablets will be threaded with four black threads each, each thread used for the braid being, say, 2 yards long. The next eight tablets are threaded with two white and two black threads each as shown, and the last two with four black threads each. As each tablet is threaded it is passed on to the piece of stripwood and the four threads knotted together at each end. Fig. D shows a similar threading, but in this case the positions of the inside eight tablets differ from those in Fig. C. The weaving can now be proceeded with, the warp being stretched tightly between two chairs as shown in Fig. E. Having removed the piece of wood, the weft thread is passed through to the left of the tablets, the tablets are turned all together one quarter turn, the work is closed up by inserting the paper-





Apparatus Used for Tablet Weaving, with Some Typical Designs.

knife to the left of tablets and pressing it to the left, the weft thread is passed back, the tablets are turned another quarter turn, the work pressed up, and so on, repeating these three movements in succession. When the threads to the right of the tablets become so tightly twisted as to make further progress impossible they are untied from the chair and untwisted, the finished braid being untied also and the whole moved to the left before being tied to the chairs again.

Belts, pyjama girdles, braces, and dress trimmings can be made from the braids, or they can be used for any purpose where a stout, narrow tape or braid is required.

TAXIDERMY: TO PRESERVE FOX, DOG, OTTER OR OTHER SIMILAR ANIMAL

Measurements.—Take measurements of the specimen before commencing skinning operations, also the colour of the eyes. The length from muzzle to tip of tail, breadth, width and circumference of head and body in various parts should be noted down.

Knives.—Two very useful and good knives for skinning can be obtained from a seller of shoemakers' " grindery," namely, a small sharp-pointed knife called a " clicker " and another larger one as used for cutting out soles of boots.

Skinning.—Lay the fox, for an example, on its back on a bench or table. With the point of the large knife make an incision through the skin of the chest, starting at the bottom rib, continuing the cut, through the skin only, to within 2 in. of the tail, taking care not to puncture the inner skin of the abdomen. Ease the edges of the skin off the body by pushing and carefully cutting the membrane between the skin and flesh.

Have a small quantity of dry plaster-of-paris ready to hand with which to dust over the skin and flesh as the skinning proceeds, to keep the skin from sticking, and to soak up any blood. As the hind legs are reached, saw through the bone and cut off just below the knee joint. Cut free the ventral orifice. Continue skinning up each side towards the back, until the back is free to the root of the tail. Skin up the tail as far as possible.

Then, after fixing a pair of nail pincers in a vice attached to the bench, place the skinned portion of the tail through the hollow of the pincers. Now by pulling and jerking on the root of the tail, the unskinned part can be made to slide right out from the tip.

Skin round the body until the fore legs are reached, work down the legs some distance, and cut the limb free at what is really the elbow joint. Continue skinning up the neck towards the skull, the skin now being inside out.

As the skull is reached, cut through the thick cartilage at the base of the ears, to free the ears. Carefully skin round the eyes, cut through the very thin membrane surrounding the eyeballs, to free the skin from the eye sockets. Take care not to cut the eyelids in any way.

There now remains a very delicate piece of skinning, as the lips must be skinned right out to the very edges, without cutting through them. The lips must also be left attached to the gums all round. One hand must be pushed up inside the skin and placed outside the lips, while the splitting of the skin is done with the other hand, and the small knife, from the inside.

Cut through the soft cartilage of the nose close to the bone, and skin out the lips right round from one corner of the mouth to the other. Skin round the bottom jaw the same, leaving the skin attached to the jaws all round by a thin membrane only.

Before proceeding further, measurements should now be taken of the bared skull and a rough outline drawn, showing the depth of " stop," depth and length of head, also circumference round the thickest part and round the face by the eyes.

The head can now be sawn off with a small saw, so as to expose the brain. The flesh between the lower jaws including the tongue can be cut away at the same time, leaving it attached to the body.

The ears must be skinned out to the tips, turning them inside out like the finger of a glove, removing the flesh from the base.

Cut and scrape off all the flesh from the skull and remove the eyes and brains.

The legs can now be finished. The skin on the fore legs can be liberated by some persuasion and cutting, right down to the toes, which must not be cut off, but all the flesh must be trimmed off the leg and foot bones.

The hind legs cannot be skinned out to the toes in the same way, but a cut must be made up the back of the pad, the flesh trimmed out clean, the cut being sewn up again after the preservative is applied.

All fat must be cut and scraped off the skin before applying any preservative.

Preservatives.—The best preservative for animal skins, even large skins like the lion's, is : 1 lb. of burnt alum and ¼ lb. of saltpetre.

Well pulverise the two together and mix thoroughly. Rub this mixture into the flesh side of the skin as soon as taken off. To dress the tail, pour some of the powder into the tail, add a little water and work it down to the tip with a piece of wire.

After leaving it to penetrate for a day, the skin can then be painted over with arsenical soap, which will permanently preserve it from attacks by insects. The preservatives must be thoroughly applied to all parts, leaving no folds in the skin untouched.

Arsenical Soap.—A good arsenical soap can be made as follows : 2 oz. of arsenic, ¼ lb. of soft soap, ½ lb. of whiting.

Place the arsenic in an old saucepan or tin can, mix the whiting with water to make it of a creamy consistency, add the soft soap with more water, and pour the mixture over the arsenic. Stir well together and place over a fire until it boils, stirring occasionally. Remove from the fire as soon as it boils up and take outside into the open air to cool. *Do*

not inhale the fumes. Put into a tin and seal up when cold. Label it "poison," and keep in a safe place. As required take out a sufficient quantity for the work in hand, add water to bring it to a creamy mixture and apply with a small paint brush.

To Stuff the Skin.—Commence on the head. Fill in the brain cavity with fine wood wool. Lay some of the same along the skull to replace the flesh that has been cut away, also place some in the cheeks, throat, and eye sockets. Bind this altogether to the skull with shoemaker's hemp or fine twine, referring to the measurements taken previously. Mix some plaster-of-paris in a basin with water to a creamy condition and brush it in and all over the bound-up skull and head, putting more plaster on in places where required to bring the model to shape. Leave it for an hour or so, when it can be trimmed with a knife into the exact shape and size that the head was when freshly skinned.

Spread the ears out flat on a piece of card, mark round with a pencil and cut out the shape of the ear but a bit smaller, so that it can be slipped up inside the skinned-out ear between the two surfaces.

Place a layer of putty right round the upper jaw along the gums, also some in the nose, another smaller layer along the bottom jaw. Draw the skin back over the skull, squeezing the putty down into the lips that have been split apart. With a little coaxing and patting into shape the head should now assume a good natural shape.

The feet and legs are the next important parts. Fill out the pads with chopped tow, wrap some more round the leg bones, roughly modelling the tow to the shape of the muscles, and draw the skin back over the legs.

Artificial Body.—An artificial body must now be made. Procure a length of galvanised iron wire long enough to reach from the tip of the tail to the nose, allowing more length of wire to form two loops about 3 in. in diameter. Having the body previously taken from the animal before you, make one loop in the wire to come in the chest between the fore legs, and another to come in the back part between the thighs. Proceed to make up the artificial body with wood wool. Place a bunch through each loop for a start, wind layers of the material around the wire firmly, binding all together tight with twine until a good imitation in shape and size is attained. Make the body slightly smaller than the original or difficulty will be experienced when trying to get it into the skin.

When made file each end of the wire to a point with flat cutting edges

Inserting the Body inside the Skin.—Place a layer of tow all over the inside of the back of the skin. Push the pointed wire with the neck, up inside the skin, feeling your way with it into the base of the skull, and on through the roof of the skull some inches. The point of the wire should come out in the centre, midway between the eyes and ears. Cut off the sharp point or bend over to prevent accidents. Bend the tail wire back until the point, which should not be too sharp, can be inserted into the now hollow tail. Work the tail down the wire, pushing the end of the

wire out at the tip. The tail may now be bent down into its position again.

Wiring the Legs.—Four more wires are to be cut for the legs; these must be about 15 in. longer than the leg and thickness of the body combined. Point one end of each. Insert the fore-leg wires first. Take hold of the pad and push the pointed wire up through the sole, along the back of the leg bones, through the artificial body at the shoulder. Turn the pointed end back into the body and firmly clinch it in with a pair of pliers.

It is quite essential that all leg wires should be firmly clinched or the limbs will not retain their positions.

The hind legs can now be wired up in the same manner.

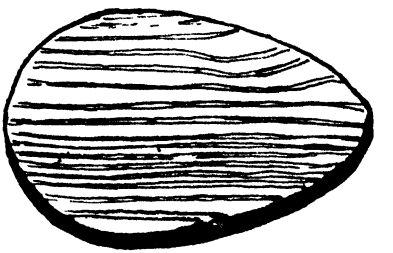


Fig. A.—Oval Block Used for the Neck.

Bend the legs at the joints in the posture you intend setting up the animal.

Proceed to pad out the slack places in the skin, keeping in mind the contour of the various muscles.

The neck and chest will require filling in and shaping. Chopped-up wood wool can be used, with tow and cotton wool for the finer details.

A piece of stout wire with one end flattened, and a V-notch filed in the end, with the other end bent into a ring, makes a good stuffing tool; it can be bent to reach round curves.

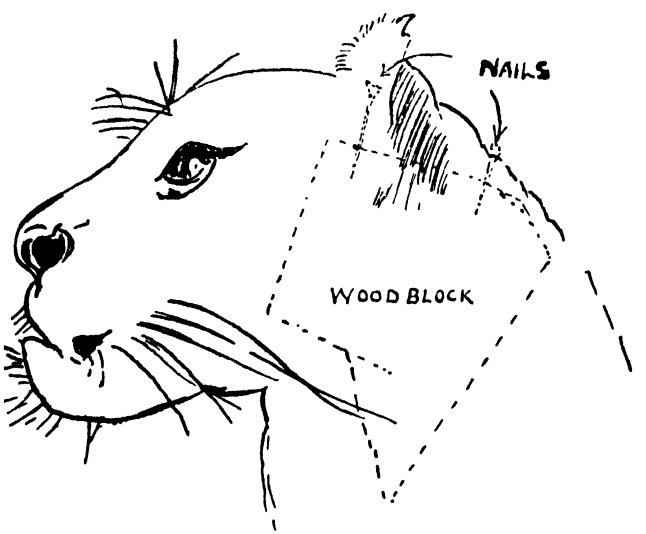


Fig. B.—Jaguar's Head Showing (Dotted) Block of Wood in Position.

After filling out the body to your satisfaction the incision in the skin is sewn up neatly. Before doing this place a thin layer of cotton wool all over the abdomen in order to get a good surface under the incision after it is sewn up. The three-cornered surgical or glovers' needles are the best to use; strong thread should be used and the stitches drawn tight.

Setting-up the Specimen.—The specimen can now be mounted on a flat board for drying purposes. Bore holes in the board for the ends of the leg wires to pass through. Pull the wires through from the back of the board, to bring the feet into a good standing attitude. Then bend the loose ends of the wires back and clinch into the board.

The head can now be finished off, the glass eyes inserted, and the finishing touches put in.

A small wire nail should be driven through the skin into the bone at the " stop " at the top of the nose just below the eyes, to keep the skin down in the hollow. The lips are kept in position till dry, by driving in needle points or cast-off gramophone needles. After all is set and dried the needles may be tapped off short, or pulled out.

Head or Mask Only.—After skinning out and trimming the flesh from the skull, a piece of wood 1 in. by 3 in. is fitted into the skull and fixed with two or three nails driven through the bone. The end comes down the neck and forms the support for mounting the head on a shield. An oval piece of board (Fig. A) is cut to fit the neck at the back and nailed to the end of the piece previously fixed into the skull. The edges of the skin are tacked all round the oval, trimmed off level. It is then ready for mounting on a shield (Fig. B).

Heads with thick skins, as some of the deer and carnivorous animals, must have the skin thinned down by paring and shaving to get a life-like appearance.

TRANSFERS, AND THEIR APPLICATION

Transfers can be applied to wood, stucco, stone or slate, metal or glass. In any case the surface must be perfectly smooth and clean, dry, and free from dust. Just before decoration the surface is thinly coated with clear gold-size or a special preparation known as Fixite. Whichever is used, it must be laid on quite smooth and thinly and allowed to partially dry until it reaches the " tacky " stage. The closely trimmed transfer is then applied, care being taken that it is laid on straight, for it must not be shifted about. The transfer has to be pressed down, and for this purpose a bone tool, such as a flexible, wide-bladed paper-knife, is used. In large work a tough pad of chamois leather is chosen, but for delicate work many craftsmen prefer to use the tips of their fingers and then the ball of the lower joint of the thumb to press down. What is of utmost importance at this stage is that the transfer should be absolutely smooth, every part of it adhering closely to the tacky surface. Bubbles, arising from the presence of air or too lavish a use of size, are apt to appear. These must be got rid of by gently squeezing out. If allowed to remain, adherence would be imperfect, blisters would appear on the designs, and these would speedily crack and peel off. This means that the picture must be pressed down smoothly and swiftly, yet thoroughly and without undue haste. When this part of the work is over, the transfer is allowed to remain untouched for from 5 to 15 minutes if on wood or stucco, about 30 minutes if on metal, and an hour or more if on glass. After this lapse of time the exposed back of the transfer is moistened with tepid water, preferably applied with a sponge or a soft camel-hair brush. Blotting or other soft, absorbent paper is laid on, and the whole well rubbed down with a flat tool or the palm of the hand. A second moistening follows, when the paper

will become detached and easily removable. It will at once be seen that the picture is covered with a thin film of gum; this should be quickly wiped off with a fine, clean cloth, slightly dampened. If the gum is allowed to remain the colours will crack, being pulled away by the contraction of the drying gum, the result being that the picture will speedily curl up and powder away. Polishing with a bone knife sometimes follows, but nothing further is absolutely needed. The decoration will be found quite as permanent as ordinary painting. It is, however, permissible to apply a thin coating of transparent varnish, which may be either glossy or matt, but should contain some oil, to prevent too rapid drying. This treatment is advisable when transfers are applied to metal, stone, or glass.

On Glass.—Transfer is largely used on glass, either in small decorative details, such as borders or corner-pieces (as in back-painting of mirrors prior to silvering), or to cover the whole surface in imitation of stained glass. A special group of designs is prepared for this work, ranging from simple chequer patterns to elaborate floral and pictorial designs, sometimes blocks, bars, and lines being introduced to represent the lead tracery. This treatment is freely adopted for staircase, corridor, and bathroom windows, being cheaper than stained glass, but quite as effective for blotting out of obscuring view without exclusion of light and nearly as bright and pretty. It is less frequently applied to the top or side panel windows glazed with small panes. The transfer should be applied to the inside of the windows and the covering coat of varnish be thin and water white.

Transfers from Prints.—These are made by printing with an oily ink on paper which has previously been coated with a special size, so that when the transfer is placed on an article and the paper is wetted, it parts readily from the " print " and leaves the latter in place.

To make transfers from prints on papers, make a mixture of water and soap, one part soap, two parts water. Boil, stir well, and allow to cool. Cut in cakes, rub on print, and press on soft white paper. A small quantity of turps may be added. This mixture may also be made thin, applied thinly to prints. Copy as above. Same for wall-paper if paper is printed with glue. Mixture best if applied to plain paper first in many instances. For wall-paper, if washable, apply a thin mixture of methylated spirit and gum benzoin to the wall-paper.

UPHOLSTERING A SETTEE

A stuff-over settee to match with the easy chair[1] is shown by the accompanying drawing, Fig. A. This, with two of the chairs, would complete a three-piece set, of the present mode.

It could be made any length from 4 ft. to 6 ft.; measurement across the front, at seat. About 4 ft. 6 in. is the most popular; that is, 5 ft. overall; what would be a five-foot settee. The other dimensions may be in the same proportion as those given for the chair; but of course they may be altered as required.

[1] Shown on page 177.

Fig. B shows the construction of the framework in birch of 2 in. square section; except that the front uprights are 1 in. wider than those of the chair, made of 3 in. by 2 in. wood. It will require the strengthening

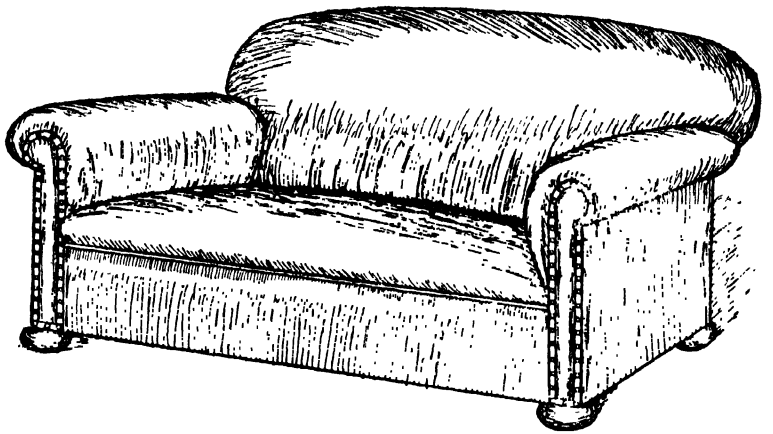


Fig. A.—The Complete Upholstered Settee.

braces fitting in the corners of the bottom frame, which has an extra centre rail dividing the space.

Springing the Back and Arms.—The upholstery work can be carried out the same as described for the chair; but should it be so desired, the

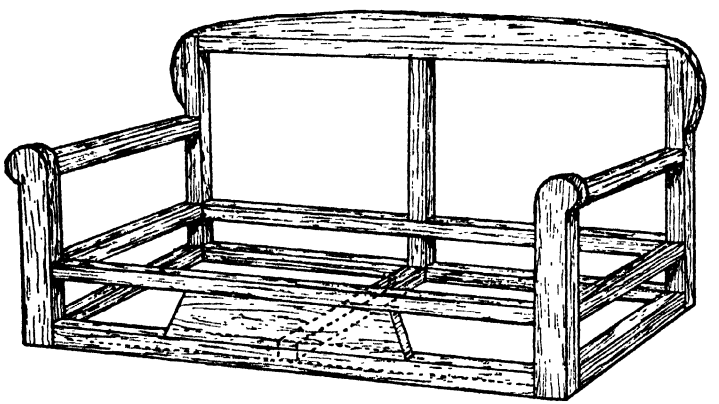


Fig. B.—Framework of the Settee.

back and arms may be sprung. For this, the back would require webbing three lengthwise, as well as three vertical to each other.

Twenty-one springs may be put in, 6 in. No. 12 gauge, in three rows of seven to each row; stitched at the positions indicated in Fig. C. On the centre bar of the frame a short piece of web is doubled in the length

and fixed with webbing tacks across the bottom coils. In some cases, the two lower rows only, fourteen springs would be put in.

For the arms, three short webs are put across the space, one 1 in. from the back upright, to allow for pulling through the upholstery, the others to help support two springs only, 4 in. No. 12 gauge, fixed in positions shown in Fig. D; which also shows the three springs, 6 in. No. 12, fixed by a piece of web tacked over the bottom coils and another piece over the top to which they are stitched.

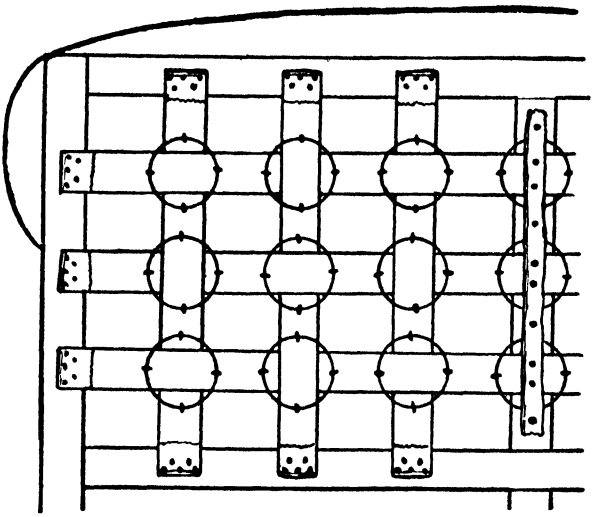


Fig. C.—Showing Method of Webbing and Springing.

The canvasing, stitching, stuffing, and covering are the same as already described for the chair.

Superior-grade Upholstery.—The settee and easy chair with fair usage should give good service for from ten to fifteen years before needing repair. But for higher-grade furniture the upholstery work would be built up in a first stuffing of fibre stitched up the scrim, and a second stuffing of curled horsehair covered in calico, then wadded for the final covers.

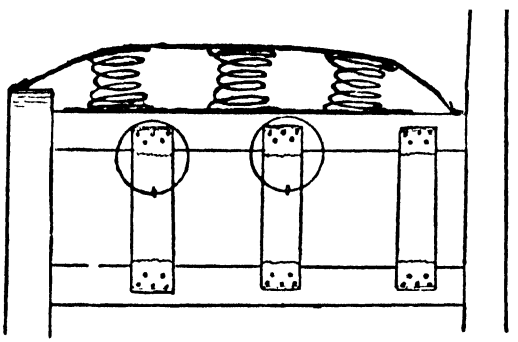


Fig. D.—Side View, Showing Seat Springs and Side Webs.

Better still is to use all curled hair for both stuffings, of which there are various qualities. Being light and springy, it keeps softer and in good shape much longer than any other filling. With it are used good-quality fabrics both for inside and outside work; together with good workmanship; resulting in handsome appearance combined with comfort and many years of service.

Upholstery Materials.—In practising upholstery work some general knowledge of materials is necessary.

English web is manufactured in the piece of 18 yds.; German and other cheaper webs, 36 yds. Tacks, $\frac{3}{8}$ in., $\frac{1}{2}$ in., and $\frac{5}{8}$ in., improved for webbing: in packets or bundles of ten packets.

Canvas and scrim, each in three general qualities, all 72 in. wide. Wad-

ding in separate sheets of 1 yd., or in a roll of yards. Twine in the ball, two sizes, stitching and spring lashing twine.

Leather-cloth materials are in 48 in. widths, of many qualities, grains, and colours; on muslin, drill, and duck, several grades. The muslins are a wonderfully economical substitute for skins and leather; admitted to be, though cheaper, more durable than the thicker varieties that appear stronger and have a superior appearance.

Heavy velvets in various colours and patterns are also 48 in. wide.

Tapestries and moquettes, all 50 in. widths in many varieties.

Gimps and bandings can be bought by the yard or in the piece, to cover up the tacked edges of any material; also, gimp pins for fixing. Studs and buttons are obtainable by the dozen or in packets of one gross, of all kinds. Solid leather studs and French studding nails, in boxes of a thousand, can be bought in small quantities. These latter are in brass, copper, nickel, and oxidised " antique." They are very useful, and much used in banding the facings of easy chairs and settees, besides for close studding certain light upholstery; and some antique Heppelwhite chairs require two gross to each ordinary chair seat, in two rows all round.

Black linen makes the most suitable bottom covers in widths of 30 in., and in several grades.

UPHOLSTERING EASY CHAIRS

There are many different styles of easy chairs, in various grades of workmanship and materials according to quality and price.

The usual cheap chairs are economically made; having a simple, lightly constructed framework, upholstered in a simple, economical manner; seat webbed three each way supporting five moderate springs covered with medium canvas; and a stuffing of wood wool and flock, covered with a suitable material of proportionate worth. The back and arms are simply canvased, lightly stuffed and covered.

These give reasonable service, and would be good practice for the home craftsman to work upon, either to make or re-upholster; improving, however, on the original, which was only a legitimate way of keeping within a limit of cost, to offer full value for a modest figure.

Then there are the varying degrees of chairs with seats having from six to nine springs, and upwards, to the fully sprung chairs, including back and arms and the double-sprung seat.

During recent years there have been several inventions combining the springwork manufactured to fit into the wood framework; but some of these have not given the good results expected. Also, it is thought they might be troublesome to repair. However, on the whole, many practical upholsterers believe that the older method will always be the most adaptable.

Constructing the Framework.—Chair frames are usually manufactured wholesale and supplied to upholsterers, with or without the springwork; and may be purchased singly. But woodworkers often

construct frames to their own requirements; which is chiefly a matter of making strong dowelled joints.

It is the purpose here to describe the construction and upholstering of an easy chair of a type most generally required, but planned to enable the handyman to do the work throughout.

The style of chair is shown by the accompanying illustration, Fig. A, and the framework by Fig. B.

The kind of wood to use is plain chairmakers' birch, which can be purchased in lengths of 2 in. square section. It could be supplied cut to the

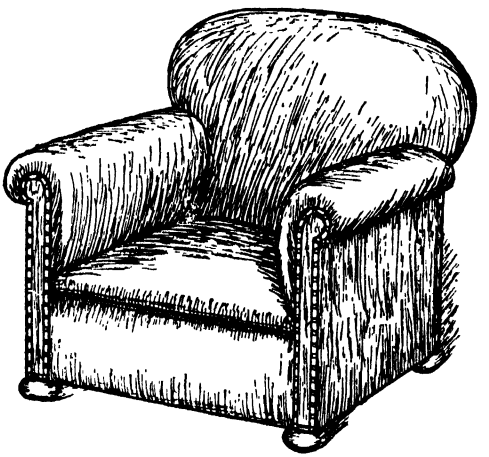


Fig. A.—Showing Type of Easy Chair Upholstered.

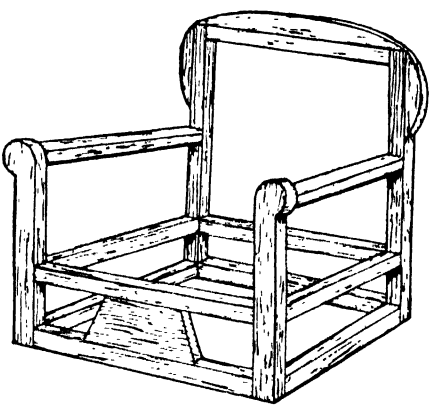


Fig. B.—Framework of Easy Chair.

exact measurements, ready for jointing together by two or three $\frac{3}{8}$ in. wood dowels to each joint. All sharp corner edges should be trimmed off, as they have a wearing effect on the fabrics.

The back and front frames would be made first to the sizes given in Figs. C and D. This latter shows a 26 in. seat; but they are also made 27 in. and 28 in.

These two frames are connected by the six side rails, as shown in Fig. E; the rail ends being cut to a slight slant, as seen in Fig. F. This being the base part of the framework, it is strengthened by four corner braces, neatly fitted, glued and secured by screws or wire nails.

Bowl Feet and Castors.—The feet are plain turned globular shape, $3\frac{1}{2}$ in. diameter by 2 in. These usually have a pin turned to fit into the end of the framework uprights; but it is apt to weaken the dowelled joints. It is better to fix them with three screws at triangular points round the centre; which is left for the castor screws when these are to be fitted. The feet may be solid or turned hollow for the castors, as shown in section by Fig. G.

Another method, without castors, is to fix the solid foot with one strong

central screw, the head well countersunk, the wood being smoothed with glass-paper and linseed oil rubbed in. When dry it will glide easily over floors and carpets without wear or damage; or a set of 1½ in. diameter gliders may be put on, as in Fig. H. The feet should be glued as well as screwed.

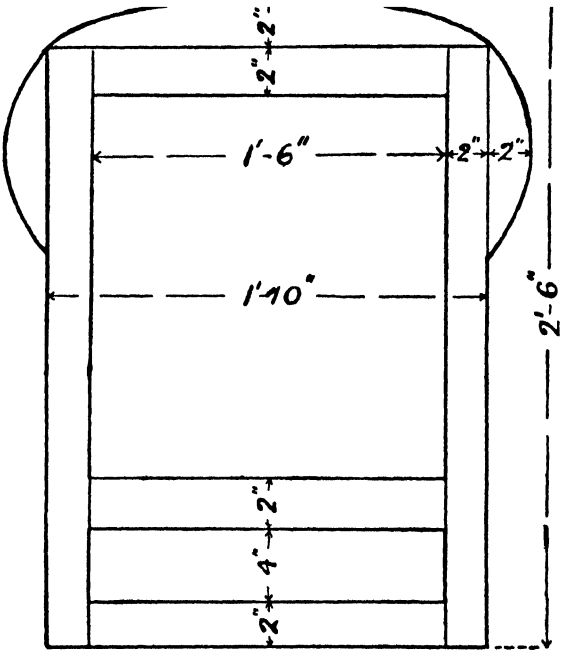


Fig. C.—Dimensions of the Back Framework.

The castors usually put on manufactured furniture are not satisfactory, except on first-class goods. On the cheaper grades the castors are often worse than useless. Not only do they not run well, but they drag carpets and linoleums and do damage.

Yet an easy chair such as this can be fitted with a good set of 1 in. cast brass pot-bowl screw castors, at a cost of less than 3*s*., that, with a touch of oil on the swivel and bowl pins about once a year, will enable the chair to be moved with ease, and will give good service for twenty years or more.

The wood feet of birch must be stained and polished.

Tools, Webbing, and Springs.—The tools for making these stuff-over chair frames consist of a 3 ft. rigid rule, a square and bevel, a hack-saw, plane, marking-gauge, brace and ⅜ in. dowel bit, dowel-end rounder, screw bit and countersink, screwdriver, sprig bits, hammer and mallet. For upholstering—a light and medium tacking-hammer, tape measure, bent-point packing-needles for thin and medium twine, a 9 in. two-pointed stitching needle for the thin twine, two or three sizes of curved or circular needles, regulator, scissors, and trimming-knife. All ordinary, easily obtainable.

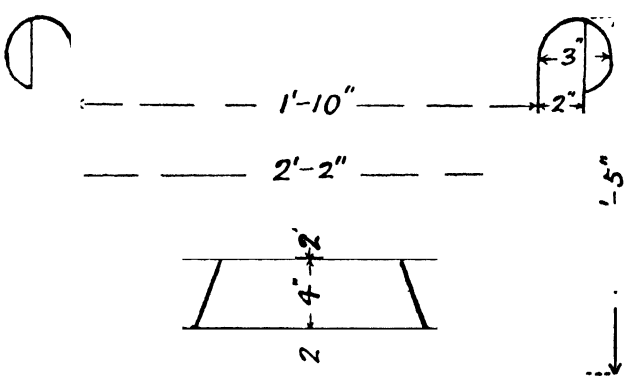


Fig. D.—Dimensions of Front Framework.

A web-strainer tool looks more important in use; but the plain piece of soft wood (deal) 5 in. by 3 in. by 1 in. serves the purpose quite expediently.

To web the chair bottom it is placed in an upside-down position, resting the arms on something a foot high, convenient for working on the under side of the lower rails.

For this class of work the plain drab web may be used, as it is not seen and is quite strong, but has not so good an appearance as the English web. It costs considerably less and can be bought by the yard or in the piece of 36 yds. First, four are put from back to front, the ends being doubled over and fixed with five $\frac{5}{8}$ in. webbing tacks, dividing the space fairly equally; then four across interlaced, these latter being kept more towards the front rail, as seen in Fig. I, which also shows the springs stitched in position at four points on each bottom coil. For this the packing-needle and thin, strong twine are used, double; but it is done with the chair the right way up, preferably on a trestle, to be clear on the under side.

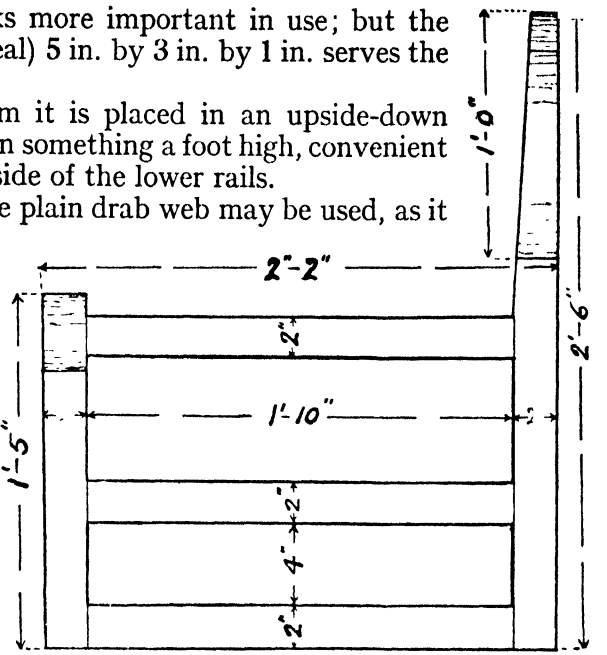
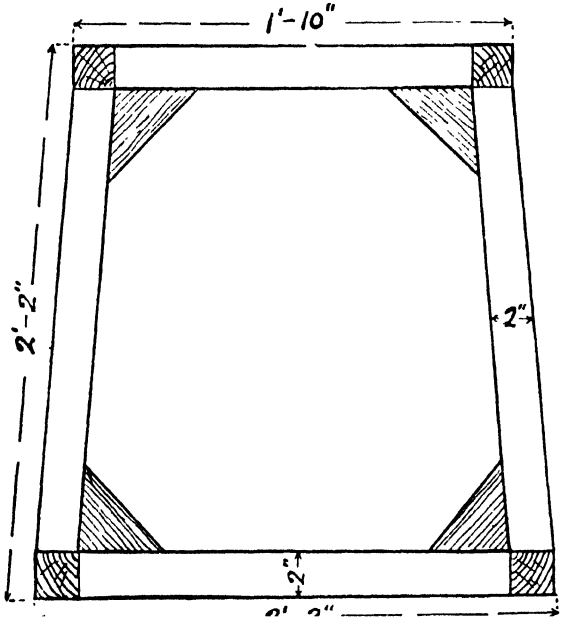


Fig. E.—Side View of Chair Framework.



Lashing and Canvasing.—The springs are 10 in. No. 8 gauge, and the next process is to lash them across the top coils with strong, thick twine. A $\frac{5}{8}$ in. tack is partly driven opposite each spring, on the upper side of the four rails and in the three bottom and front seat rails; and three lengths of the twine are tied at the end round each tack on the back rail; also on one side rail; driving the tacks to fix.

They are lashed over the

top coils, pulling down the springs nearly level with the front seat rail, keeping them in upright position and fixing the twine round the opposite tacks; but at the back and side rails the cord is twined round the second coil from the top. A plan of the lashed springs is shown by Fig. J.

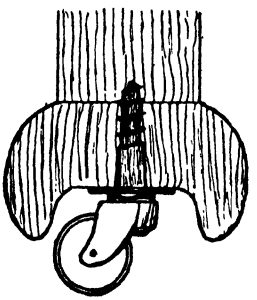


Fig. G.—Roller on Foot of Chair.

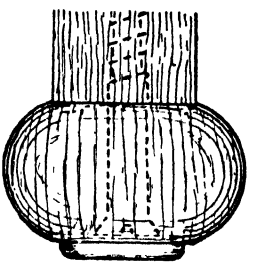


Fig. H.—View of Solid Foot.

A piece of strong canvas is now stretched and tacked over the springs, doubled over about an inch on the back and side edges, fixed with ½ in. tacks, in a line over the twine tacks; but not doubled on the front edge, which must overhang about 7 in., as in Fig. K; which also shows the canvas stitched to the springs, and the front seat rail looped for stuffing to form the roll edge. The string loops pass into each other at the centre.

As stuffing, white cotton flock and wood wool are clean, cheap, and serviceable; quite suitable for this purpose. Some of the flock is packed under the twine loops to be covered by the canvas turned in and tacked behind it, to make a firm "roll" about 2 in. diameter, as shown by Fig. L. It must be left at that for the time being to work on the arms and back.

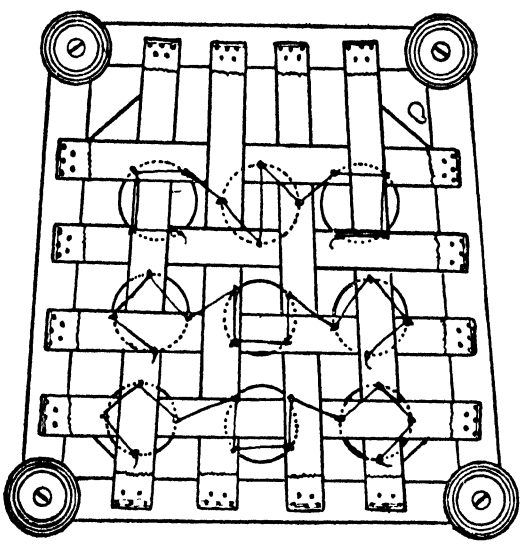


Fig. I.—Plan View (Underneath) of Seat, Showing Webbing, etc.

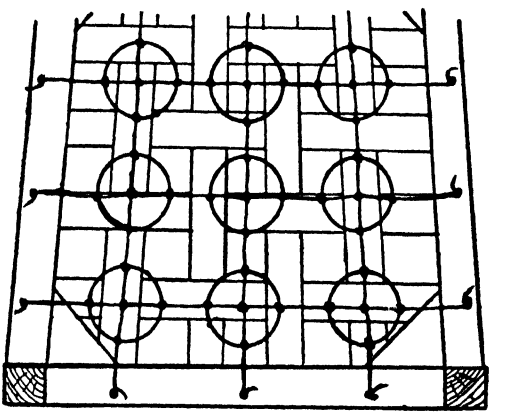


Fig. J.—Showing the Springs in Position.

Stuffing the Arms.—On the inner side of the arm rails a piece of web is fixed across from the lower to the upper one, at about an inch from the back upright. A piece of strong canvas measuring 31 in. by 21 in. is then doubled and tacked along the lower rail, stretched over the space and

tacked along the arm rail and on the outer side, allowing 6 in. hanging over, to make a "roll" 1½ in. diameter. Also, 5 in. is allowed over from the tacking along the front upright to form a roll 1 in. diameter, tapering off at the points towards the seat and the curl of the scroll.

There will be a few inches of canvas to pull through the 1 in. space at the back upright, which for the present is simply tucked in round behind the web.

It will be best to have this chair stuffed up in common calico under covers. For the arm, a piece will be required 32 in. by 22 in. to be tacked on the lower rail, as the canvas was; then a stuffing of wood wool may be packed on, having a top layer of the flock, the calico being drawn over and tacked to the arm rail and front of the upright. The tacks are only slightly inserted, for the stuffing to be pressed and stroked into suitable shape, to be readjusted as required, and finally driven when the shape is correct. At the back, the calico is just pulled through and tucked in behind the web.

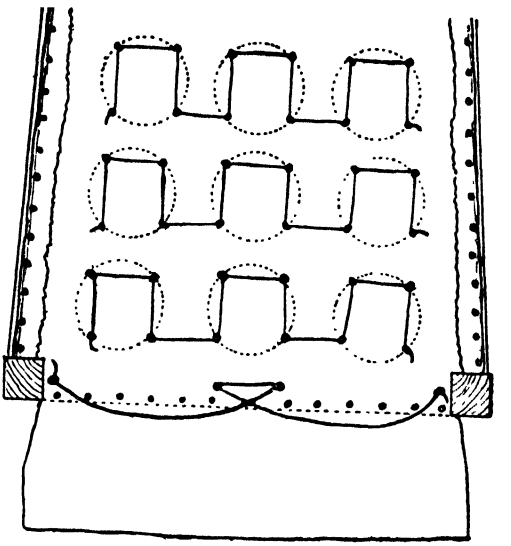


Fig. K.—Method of Lashing and Canvasing.

The upholsterers' regulator tool is used for thrusting through the calico to work any lumpiness into hollow places.

Stuffing the Back and Seat, and Covering.—When both arms are stuffed, the back can be done in a similar manner; but having three webs (vertical) to support the canvas, and making the " roll " along the curved edge. It is stuffed about 5 in. thick at the lower part, sloping thinner towards the top edge. The calico is pulled through the back arms spaces and may be tacked to the uprights.

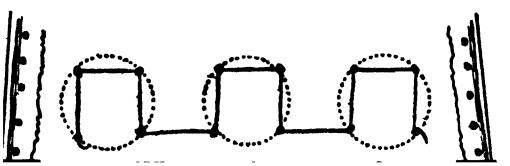


Fig. L.—Making a Roll in the Upholstery.

Now the seat can be stuffed about 3 in. thick, to be covered with the calico, tacked on the front seat rail, and on the back and side bottom rails.

The chair can then be measured for the final covering material. Supposing this to be something of plain pattern such as the leather-cloth variety, the tape would be pushed through between the seat and back to measure from 1 in. on to the outside of the second rail to 1 in. on to the top curve; and across at the thickest

part, from 1 in. on to the back of the uprights. The arms are measured likewise. The seat measure is taken from 1 in. on the back and side second rails to 1 in. on the front rail. The back must be covered first; then the arms and seat. It greatly improves to put a layer of sheet wadding over the calico.

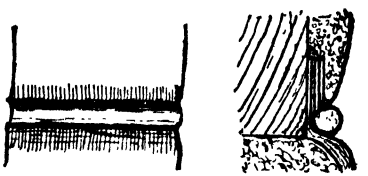


Fig. M.—Details of Piped Front Seam.

Between the lower and second rails the spaces should be stuffed up level with wood wool, kept in by strips of canvas tacked over.

Covering the Outsides.—The outside arm covers must be put on next, and these will measure 28 in. by 16 in. They are back-tacked to the arm rail, and 1 in. on to the under side of the bottom rail; also on to the back and front uprights.

The back cover is tacked on the under side of the bottom rail; but the other edges must be neatly turned in and fixed with fine gimp pins 1 in. apart.

The space between the front bottom and seat rails must have a piece of canvas tacked over to receive a light padding of the flock covered with wadding. Then a strip of the covering material is cut 2 ft. long by 2 in. wide, to be equally doubled lengthwise over a length of twine to form a piping. This must be tacked neatly under the front stuffed edge of the seat.

A facing piece, 2 ft. by 9 in., is next required, which is laid with the surface side over the front of the seat so as to back-tack the edge close under the piping; then it is drawn over the padding and tacked under the bottom rail, also to the uprights; stretched out smooth, free from wrinkles; see Figs. M and N.

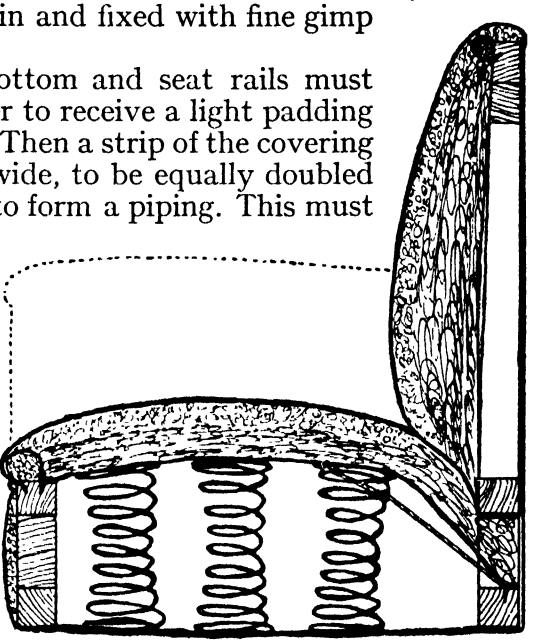


Fig. N.—Section through Seat and Back of Chair, Showing Springs and Upholstery.

Two facing pieces must be cut to cover up the tacking on the front of the uprights. These will measure 1 ft. 6 in. by 3½ in., to be neatly turned in and tacked over a light padding of wadding; finished off with a banding and studs.

A bottom cover of black linen completes the chair.

UPHOLSTERY REPAIRS TO EASY CHAIRS

As all upholstery wears out, there is always repair work to be done from time to time in every home. Easy chairs and settees in particular get much used, and are often allowed to become extremely shabby. The longer neglected the worse they get.



Fig. A.—Easy Chair in Need of Repair



Fig. B.—The Chair complete with its Repaired Seat

UPHOLSTERY REPAIRS TO EASY CHAIRS



Fig. C.—Chair Bottom stripped, showing Interior intact.

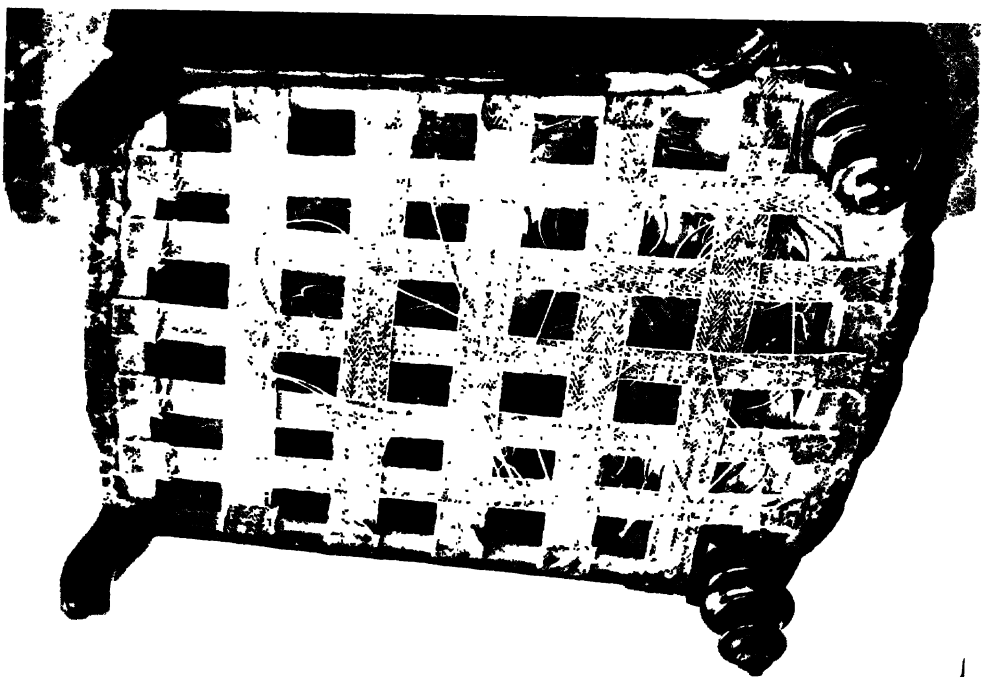


Fig. D.—Chair Bottom rewebbed, showing Stitching of Springs.

Yet, in many cases, by attending to any breakdown without delay it can be rectified at not much trouble or cost. It is the purpose here to describe a typical example of the first repairs necessary to most easy chairs, even of quality.

The photograph, Fig. A, Plate facing page 182, is of a good-class easy chair that had been in use for over twenty years without needing repair. But there is nothing cheap about it. The velvet covering is of rather high cost, that would likely only be used over a good interior. The cast brass pot-bowl screw castors are still good for years of wear. But the webbed seat bottom has broken down, and although it looks very serious, it can be renewed in less than two hours at a very small outlay.

Renewing the Seat Bottom.—The chair is turned in an upside-down position to strip off the old bottom cover and webbing, by using an old blunt chisel and mallet or hammer to knock out the tacks. When completely stripped and brushed out clean it is interesting to find a well-made framework, firm and strong in every joint.

By the feel of the upholstery it is judged to be all hair-stuffed, properly practically done. The seat spring canvas and twine lashings and the nine springs are all intact, as seen in Fig. C (facing this page).

To reweb the bottom 7 yds. of English web are required, with tacks as previously. It is commenced by tacking on the front rail and stretching to the back, fixing at the tack marks; then five across likewise.

The springs can then be worked into correct position, upright, to be stitched to the webbing with the packing-needle and twine, in the manner shown by Fig. D.

The old bottom cover, in this case, was of strong drab linen and could have been replaced; but a new cover of black linen was preferred.

Comparing Superior with Inferior Work.—This completes the repair work; but a touch of oil is put on the swivel and bowl pins of the castors, the chair being given a few spins round on a bare floor, and they will run very smoothly. The surplus oil is wiped off quite clean before using the chair on a carpet. It is now fit for many more years of useful service; see the photograph, Fig. B.

Here is a handsome, comfortable chair, after twenty years of constant wear, that has cost so little to put in repair. But now, how does this compare with low-grade work.

Some cheap chairs after less than one year in use have the bottom broken down, the springs bursting into the stuffing, which is of wood chippings, dropping through about the floor.

To repair such requires the untacking of the outside back and arm covers to strip out the whole seat and remake up in all new materials.

UPHOLSTERY REPAIRS—RENEWING LIGHT SEATS OF CHAIRS

It is the purpose here to describe one of the simpler kind of worn-out chair seats, that can be made right without much delay, trouble or cost.

The accompanying photograph, Fig. A (Plate facing this page), is of a good-class, light, mahogany drawing-room chair. It has what is called a "pin-cushion" seat; a method which is much in use for cheap, medium, and first-class furniture. The webbed bottom has broken down, and the silk tapestry is worn shabby. So it is being stripped; for which an old joiners' chisel and mallet are used to undo the tacking all round and lift the stuff off altogether. A novice should carefully observe the work and materials, to be renewed in the same manner.

The inner square edge of the seat frame is found to be rather raw and sharp, having a wearing effect on the web and canvas, so it is trimmed off by rubbing down with a piece of coarse glass-paper. This will ensure the seat giving longer service.

Rewebbing the Seat.—To reweb the frame, No. 12 English web is used which can be bought from general furnishers, drapers, and hardware stores; also some ½ in. cut tacks as sold in packets for about 9*d.*—the full packet containing about a thousand tacks. The smaller boxes of inferior tacks are not of much use.

To commence—one end of the web is doubled over about 1 in., to be fixed with five tacks at the centre of the back seat rail. It must then be stretched across to fix on the centre front of the frame with three tacks whilst being held, to be cut off, allowing 1 in. to double over, and two more tacks inserted.

A light hammer should be used, and the tacks put in an irregular line, to avoid splitting the wood. Two more webs are fixed equally dividing the spaces, then three interlaced across likewise. For stretching the web, a block of wood 4 in. by 3 in. is used, in the manner shown by Fig. B. Observe that it is doubled over the end bearing against the polished wood to avoid chafing, also to obtain a firm grip. This method is practised by many professional upholsterers in preference to using the web-strainer tool. Over the webbing a piece of strong coarse linen or fine canvas must be stretched tight, the edges being doubled over and tacked, to receive the stuffing of curled horse-hair.

Stuffing, Covering, and Gimping the Seat.—This, after being laid on the ground and beaten with a stick to soften it, is replaced as before, to be covered with calico, fixed with ⅜ in. tacks; thus bringing the seat to the shape.

It is now stitched, with a needle and thin twine, through at points about 3 in. from each corner, and midway between, the eight stitches showing about ½ in. long on the under side and 4 in. on the calico. They need only be moderately tight, the purpose being to retain the stuffing in place; otherwise it sometimes has a tendency to work from the front to the back, or according to the usage the chair gets.

In this particular case the same kind of silk tapestry is used, cut to the correct size and shape, as the old one, laid on true to the pattern. Three layers of wadding are placed over the calico; then the cover, which is first fixed with three partly driven tacks at the centre of the back edge; also

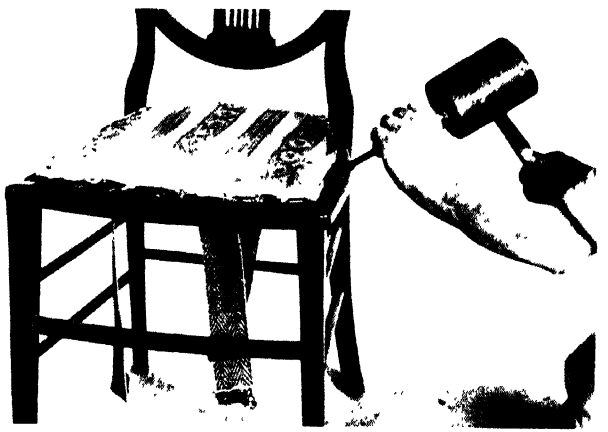


Fig. A.—A Chair with Worn-out Seat being stripped

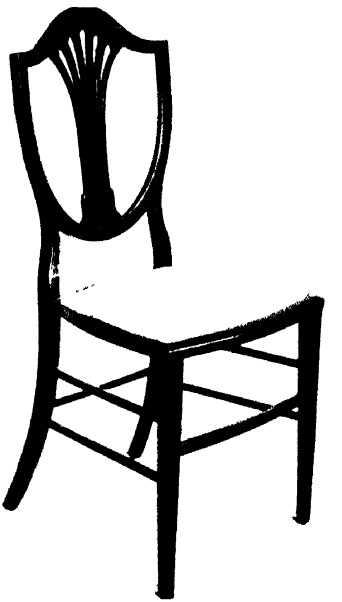


Fig. C.—The Chair complete with its Repaired Seat

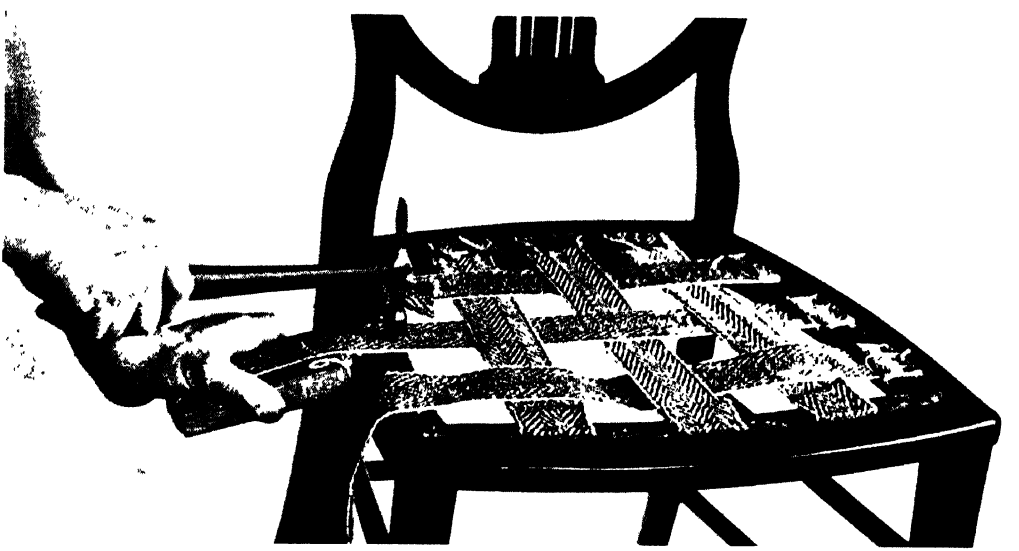


Fig. B.—Rewebbing the Chair Seat.

REPAIRS TO SEAT OF EIGHT TYPE OF CHAIR

at the front and side edges and working towards the corners, each side alternately, to get the lines and pattern straight and true. Observing that it is right, the tacks are pulled, a few at a time, to turn in the edge of the stuff and reinserted permanently about 1 in. apart.

Finally, the tacked edges are covered with a gimp to match, fixed neatly on with fine white gimp pins. These are inserted at every fourth scroll in the threads of the gimp, which can be done in a way to get them under out of sight. This completes the chair as shown in the photograph, Fig. C.

UPHOLSTERY REPAIRS—PUTTING A NEW WEBBED BOTTOM IN A SPRING-SEAT SETTEE

Fig. A on the Plate facing page 186 shows a settee in ebonised wood, upholstered in a strong velvet. It is a good-class article of furniture, but the webbed bottom has completely broken down. Although it might seem a rather serious undertaking to rectify, an upholsterer could do it in less than two hours; but the amateur should not trouble about the time, and concentrate on doing the work correctly. A handy housewife ought to be able to do it quite well in an afternoon at an outlay of less than 10*s*.

The method of procedure is to turn the settee upside down; with a dust sheet spread on the floor, the two front corners of the seat resting on chair seats.

In this convenient position it can be carefully observed whilst stripping off the old webbing; noting particularly the methods of tacking, and stitching of the springs. The stripping chisel or screwdriver should be used with a prising action to lift out the tacks more easily than by much knocking with the mallet.

Good Materials and Workmanship.—On being let down to brush out the old tacks and dust, it is found that the springs, lashed with strong twine, are quite good; well stitched to the strong seat canvas, which is in good condition, showing no signs of wear.

The stuffing being of hair, properly stitched up, has held together; whereas in cheaper furniture it would likely have gone all to mush, and be dropping through the broken canvas. The photograph, Fig. B, shows the under inside still intact.

In rewebbing the seat frame, the amateur should follow the original method, using No. 12 English web; first three in the length to the old tack marks, then eight across interlaced. But for spring seats, the webbing being done on the under-side of the frame and the springs straining against it, $\frac{5}{8}$ in. webbing tacks are used; sold in packets marked IMP^{D}. They have been termed " Improved " by the Upholstery Supply Stores for twenty-five years or more, being more suitable for the purpose than ordinary $\frac{5}{8}$ in. tacks. The manner of stretching the web is the same as shown in the light chair seat.

Stronger than when New.—When this is done the springs can be regulated each in an upright position, to be stitched to the webbing at

three triangular points on the bottom coil as previously, by means of a packing-needle and strong, thin twine.

Extra webbing may now be put on to ensure longer service; two in the length and six across, thus being almost double webbed and stronger than when new.

A cover of black glazed linen tacked neatly over the webbed bottom completes the work. It will now be seen that the seat is restored to its proper shape by observing the photograph, Fig. C.

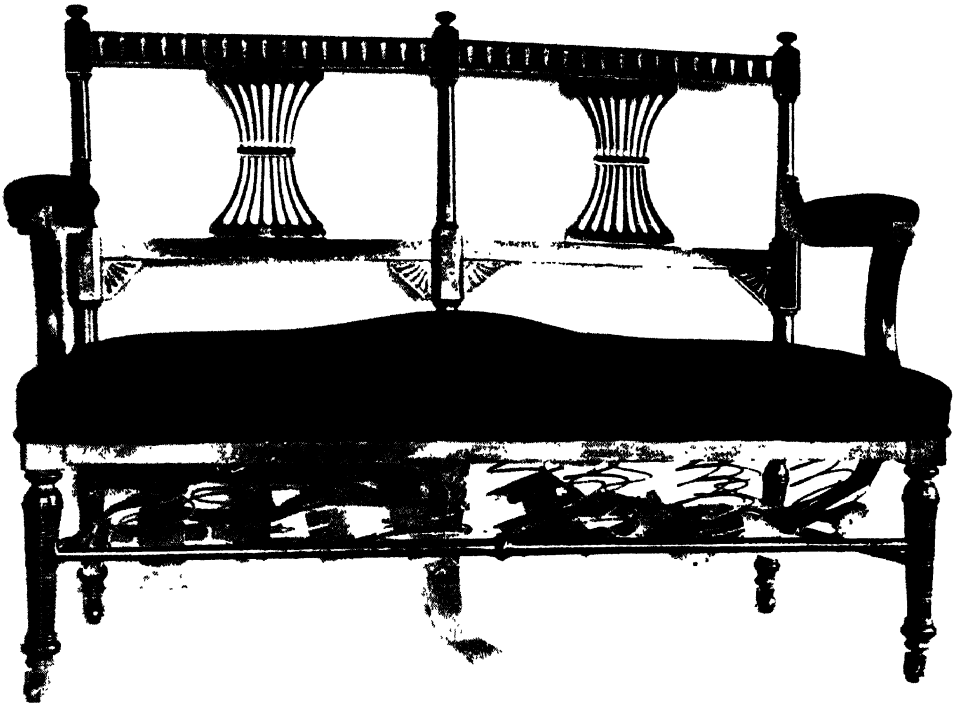


Fig. A.—A Settee with broken-down Spring Seat.

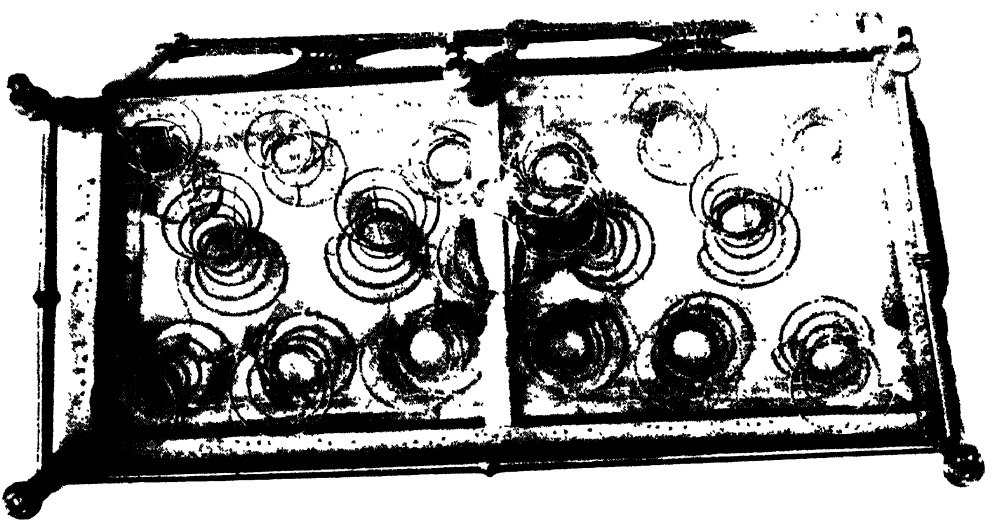


Fig. B.—Showing Springs and Stuffed Work still intact.

SETTEE REPAIRS.

Fig. 6. — Same Settee after the Bottom had been repaired.

SETTEE REPAIRS.

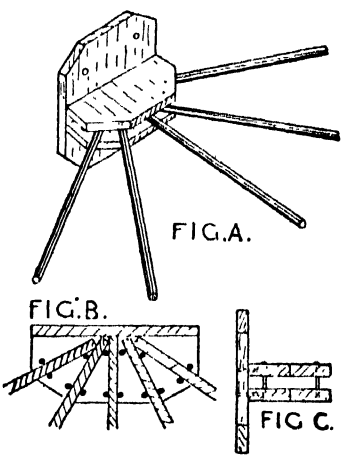
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AIRERS FOR CLOTHES

A clothes airer of the radial rod pattern made as shown in Fig. A will be found very handy in the kitchen or the bathroom, and it is easily made from short lengths of $\frac{3}{4}$ in. wood and five lengths of $\frac{3}{4}$ in. diameter dowelling. The method of construction is shown in the side view in Fig. B, and in the section in Fig. C. The piece for the back should be about 12 in. by 7 in. by $\frac{3}{4}$ in., while the two projecting pieces are 6 in. and 7 in. wide. Cut the corners off and nail the projecting pieces to the back, leaving a space of $\frac{3}{4}$ in. between. The lengths of dowelling should be cut off to a convenient length—they can be obtained up to 36 in. long, but 24 in. will be quite long enough—and fitted between the two pieces. They are kept in position by wire nails driven through, as indicated in Figs. B and C.



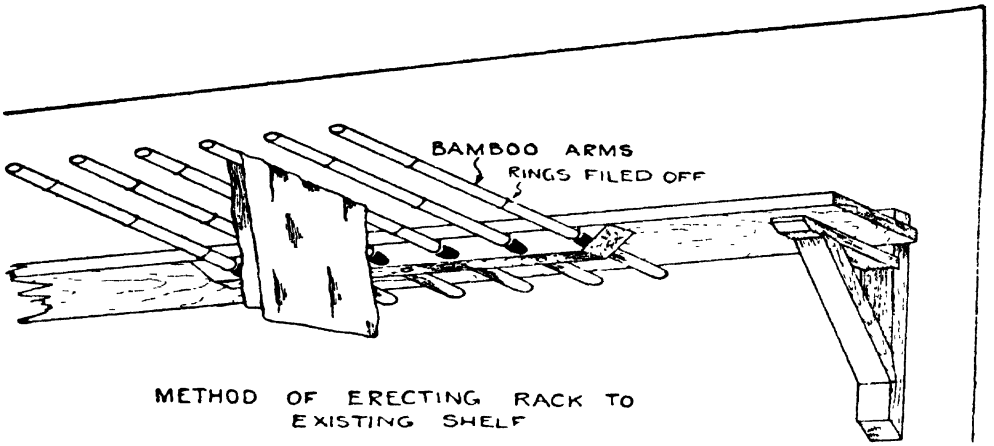
Another Type of Airing Rack.—A very simple airing rack and one that can be fitted up in almost any room is shown in the illustrations on the next page. It is necessary only to make a suitable means of supporting a number of projecting arms as shown in the top view.

It is found that 2 ft. lengths of bamboo about $\frac{5}{8}$ in. diameter are the strongest and cheapest arms to use, and in order to make them smooth it is necessary to file off the rings peculiar to this wood.

Instead of using bamboo, lengths of ash or deal broom sticks of about 1 to $1\frac{1}{4}$ in diameter can be employed; these will necessitate boring larger holes in the socket piece.

A detail of the socket piece is shown in the lower view, and is made from $1\frac{1}{2}$ in. square material. Holes of the desired number are bored so that the arms may slide easily in them, and it is then screwed to the under side of an existing shelf, as shown in the upper view.

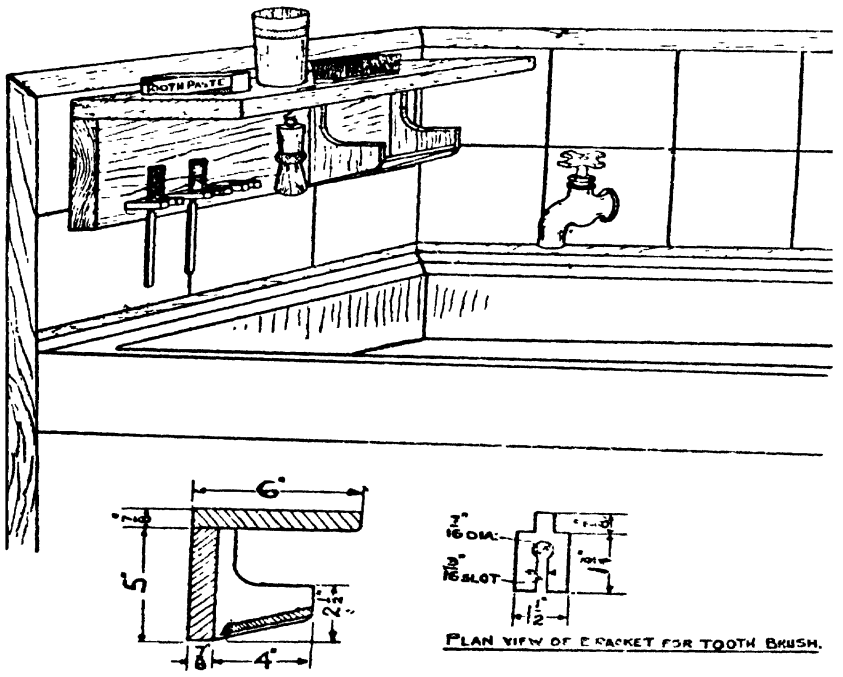
The arms can be inserted, or entirely removed when not required.



METHOD OF ERECTING RACK TO EXISTING SHELF

DETAIL OF SOCKET PIECE

Another Type of Clothes-airing Device.



SECTION THROUGH SHELF AND SOAP RETAINER.

PLAN VIEW OF BRACKET FOR TOOTH BRUSH.

A Handy Bath or Kitchen Fitting.

BATH OR SMALL KITCHEN FITTING

The fitting described here will prove to be very handy for bath or kitchen sink, the construction being as follows :

The two main pieces, shelf and back, are white wood, 14 in. by 6 in. by $\frac{7}{8}$ in., 14 in. by 5 in. by $\frac{7}{8}$ in. thick respectively. These should be secured together as illustrated. The soap and sponge retainer has two sides, shaped, and can be $\frac{5}{8}$ in. thick. The bottom, as will be seen in the sectional view, should not extend right up to the shelf back : a space should be left, say, $\frac{1}{4}$ in. wide, for draining the retainer.

Two recesses should be cut in the sides to fit the bottom. This done, the sides can then be lightly nailed. The whole should then be fitted and screwed to the shelf back.

The small brackets carrying the toothbrushes and made from $\frac{3}{8}$ in. stuff are cut as shown in the detail view. A lug is left on at the back to fit in a

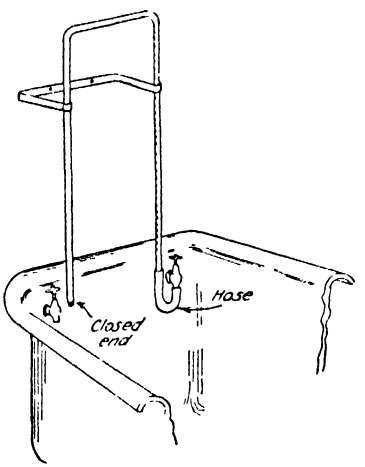


Fig. A.—Fitting a Spray to a Bath.

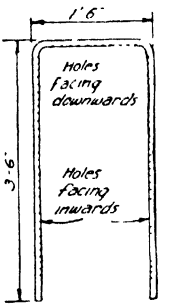


Fig. B.—Showing Dimensions of Bent Tube.

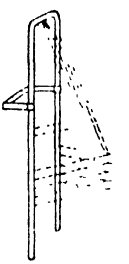


Fig. C.—Form of Spray Produced.

prepared hole, made in the shelf back; drilled holes squared out with the chisel, and the brackets just tipped with glue, will make a firm job.

The fitting is now sand-papered down and finished with enamel lacquer, white or coloured to choice. The complete unit can be secured practically anywhere with a couple of Rawlplugs.

BATH SPRAY

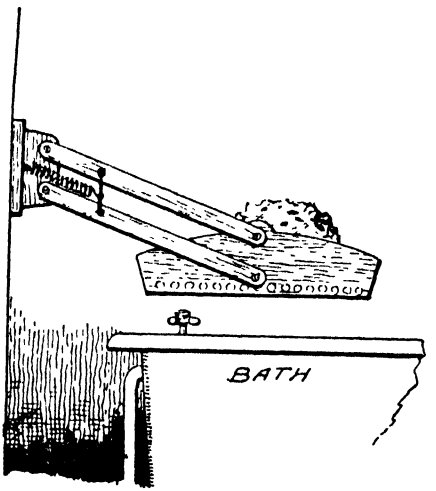
Where a spray is not provided in connection with a bath one can quite easily be fitted in the following way :

A piece of metallic tubing is obtained and bent to the shape shown in Fig. B. With a fine drill, a number of small holes are made right round the whole length of the tubing, which is then fitted up at one end of the bath as shown in Fig. A. A stay must be used to support the structure.

One end of the tube is closed with a peg of wood, and to the other is connected a length of rubber tubing or hose piping which can be slipped as required over the hot- or cold-water tap. When the water is turned on if the holes have been bored in the proper positions, the spray will take the form shown in Fig. C.

BATHROOM FITMENT

The usual tray for sponges, brushes, and other bathroom accessories designed to rest across the rim of the bath is not always convenient, as when placed at the wide end of the bath it is in the way of the bather, and if moved to the narrow end it prevents free access to the taps. The appliance illustrated is intended to provide a more convenient substitute, its principal feature being the means designed for enabling it to be raised or lowered as required.



The tray is a shallow box with grid bottom, made from lengths of $\frac{3}{8}$ in. dowelling. The size may be according to requirements. The tray is coupled to a fixture on the bathroom wall by four hard-wood links, as shown, which as arranged ensure that the tray is level in all positions. Stops are provided to limit the movement of the tray at top and bottom positions, and two springs, as shown, one on each side, retain the tray at each end of its travel. These springs should be of hard brass wire.

Alternative arrangements will suggest themselves to the constructor, e.g. a bolt through one of the pairs of links where they connect with the wall bracket, with wing-nut to put in sufficient friction to ensure that the tray is checked at any point in its travel.

The woodwork should be treated with three coats of good-quality white enamel.

BEDSTEAD, FOLDING

A bed occupies a good deal of floor space which can be left clear for other purposes by arranging the bed to turn up on end when not in use. In many cases where this is done the bed is in a living-room where its appearance is objected to as well as the space it occupies, and, therefore, in its folded position it is enclosed in what appears to be a wardrobe.

But it is not essential to enclose the bed when not in use, and the work and expense of doing so can be avoided by having the turned-up bed unenclosed as described in this article. The writer has used a bed in this

way for years, and its presence when turned up against the wall is not particularly noticeable.

An Essential Feature.—An almost essential feature in arrangements of this kind, when the bed is intended for constant use, is that the bedclothes should remain on the bed, otherwise there is the trouble of removing and storing them somewhere and replacing them before the bed can be used. In the folding beds which can be purchased this is done by holding the bedclothes on with bands of webbing, the ends of which are provided with leather straps and ordinary buckles with holes for adjustment. One of these goes across the bed near the foot and another near the head, and two others at right angles join the one near the head to keep the bolster in place.

Bands are not used in the bed described here, and the only means of holding which requires removal and replacement is a bar of wood across the bed near the foot. The bolster is kept in place by a headboard, and a light pressure across the clothes and mattress at the foot is sufficient to prevent slipping. The pressure with the bar is, perhaps, more uniform throughout its length than that of a band, the grip of which is probably most effective at the sides of the bed.

Description of the Bedstead.—The bed described here is an ordinary iron one with head and foot removed and wooden supports substituted at each end, the iron frame being hinged to the one at the head. The iron bedstead was converted in this way, because it was one already in use, but it would not have been bought for conversion into a folding bed. It would have been better to make a wooden frame with suitable spring mattress, or buy one. A wooden frame could have the hinges and other attachments screwed to it with rather less trouble than the drilling of holes in the iron one, and, moreover, it would not be quite so heavy for raising and lowering.

There are wooden frame mattresses on the market which could be bought and fitted with legs. Those with the springs attached at ends only might require a cross-bar beneath the springs near the foot to keep the springs from being pressed down too much at that place by the bar above which holds the bedclothes. A box mattress would be suitable, but might require wood strips on the exterior.

General Construction.—Figs. A and B show general views of the bedstead; Fig. C the stand to which the head is hinged; and Fig. D a method recommended for the legs at the foot. The arrangement shown has fixed legs at the foot, as in Figs. A and B, but folding legs would be neater if the bed is to be enclosed in a wardrobe.

The diagonal stays seen on the fixed legs at the foot are of $\frac{5}{16}$ in. iron wire with eyes formed at the ends suitable for attaching them to the wood with ordinary screws or to the metal with short $\frac{5}{16}$ in. bolts. The eyes are formed by making the ends red-hot and bending them with round-nose pliers.

Fig. E shows the cross-bar, which acts as a clamp on the bedclothes,

about 12 in. from the foot of the bed. It will be seen that its ends have a series of holes so that it can be adjusted to suit the depth of clothes on the bed. The bar is placed in position and a pin of $\frac{5}{16}$ in. wire at each end is pushed through one of these holes, and projects far enough through the

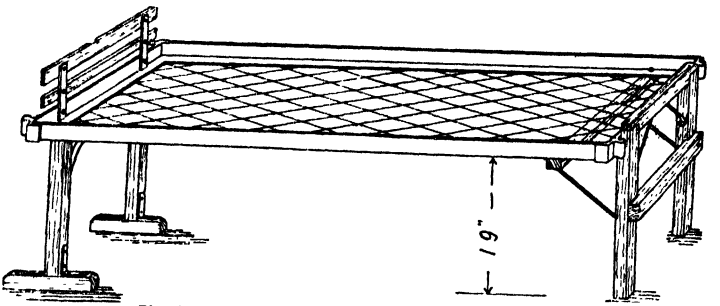


Fig. A. Bedstead on its feet

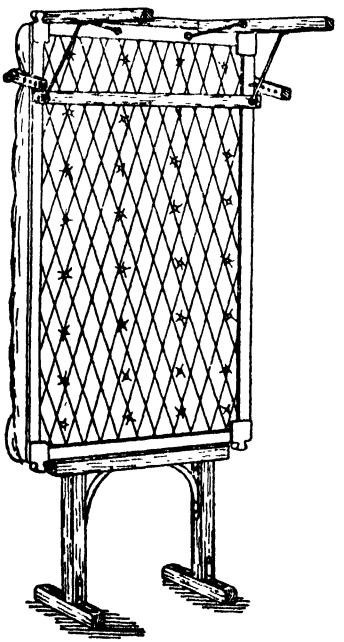


Fig. B. Bed in raised position with bedclothes on

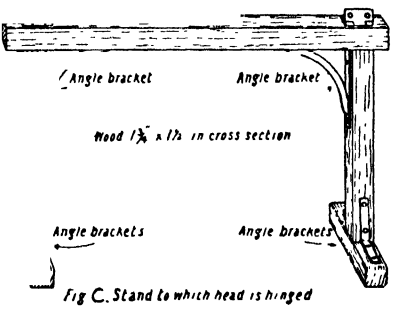


Fig C. Stand to which head is hinged

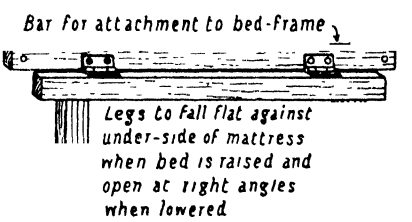


Fig. D. Folding legs for foot of bed

wood to pass $\frac{1}{2}$ in. or so under the edge of the iron frame, and the bar is thus held down as tight as desired on the bedclothes.

There is another cross-bar bolted to the under side of the iron frame near the position of the upper removable bar. Its purpose is partly to provide something more rigid than the springs of the frame for holding the bedclothes, which are practically held between the two bars with equal

pressure right across the bed, and partly as something at a convenient position for the hands in raising and lowering the bed. The bed has to be lifted first at the edge of the foot and then, as it rises, the hands have to change to a lower position beneath the mattress.

In Fig. F a side view is seen of the hinged end of the bedstead. It is held to the floor by two screws, the advantage of the latter being that the feet cannot tilt with the weight of the bed, as they may if it is carelessly raised or lowered; and also that their distance from the wall is kept exactly right for allowing the bed to lean against the wall slightly when raised, and remain there without risk of falling. No means of fastening is adopted, but simply sufficient inclination towards the wall to prevent it from falling outwards accidentally. It will be seen that the top edge of the wooden stand, where the hinges are, is slightly bevelled to prevent any possibility of binding at the hinges when the bed is against the wall.

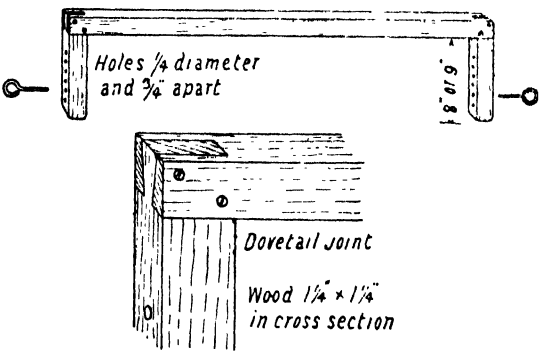


Fig E. Details of bar for holding bedclothes

Enlarged detail of this is seen in Fig. G, which shows the kind of bolts used in the angle iron of the bed. They are $\frac{5}{16}$ in. stove bolts with flat heads, slotted for a screwdriver, and $\frac{5}{16}$ in. holes have to be drilled for them through the iron. Longer bolts of the same kind are used where the wood is attached to the metal.

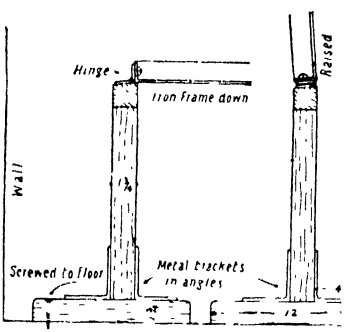


Fig F. Two views of head-stand with bed down and ...

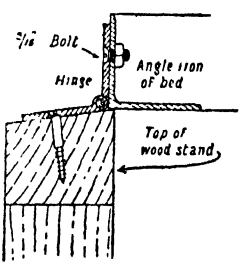


Fig G. Detail of hinged head

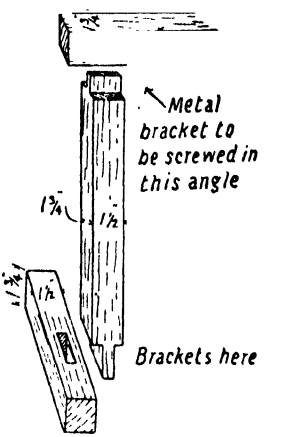


Fig H Tenoned joints of head

The headboard may be of wood slats screwed to vertical cross-strips bolted to the inside of the angle iron. These cross-strips, to have sufficient strength and be reasonably thin, should be of metal, about $\frac{1}{16}$ in. to $\frac{1}{8}$ in. thick by $\frac{3}{4}$ in. wide. If the bolster shows a tendency to roll off the

headboard when the bed is raised, it may be prevented by bending these metal strips to tilt the head in slightly on the bolster.

It should have been said before this that the iron frame of the bedstead is used in its upside-down position, so that the angle iron encloses the edges of the mattress, which probably helps a little in keeping the latter from slipping out of place when the bed is raised.

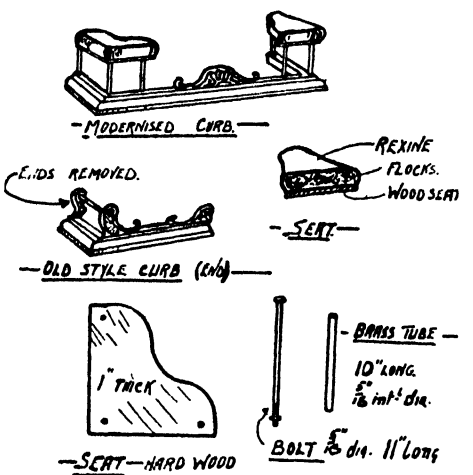
BEDSTEAD KNOBS, TO FIX

Bedstead knobs are often a constant source of trouble owing to their coming loose, either because of poor threads on the bedstead pins or because the knobs are stamped of too thin a brass. As a rule, the pins are screwed $\frac{5}{16}$ or $\frac{3}{8}$ Whitworth. A remedy which really cures and is lasting is as follows:

Obtain some nice thick brass nuts to fit the pins. If the threads are very bad it is best to run a die over them. Then slit each nut in two with a hacksaw, thus making two thin nuts. One thin nut is then carefully sweated on to the bottom of each knob, and, after being rounded and cleaned up with a file, is hardly noticeable.

BRASS KERB, TO MODERNISE

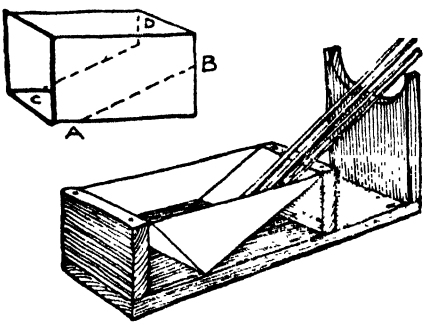
Readers possessing a brass kerb of the earlier style can, with a little work and with little expenditure, bring it up-to-date to the design now popular. To proceed, take the brass ornaments at the ends off the kerb as shown in drawing; the bolt holes securing the brass ends may come in for the seat ends to be put on; if not, holes should be drilled to suit. The seat bottoms are two pieces of hard wood, the sides being approximately 13 in. each way and shaped as the sketch. To make a strong foundation the bottoms may be about 1 in. thick; drill three holes for $\frac{5}{16}$ in. diameter bolts, one in each corner; the legs or supports are $\frac{5}{16}$ in. diameter bolts threaded through the wood and then through brass tubing; the tubing forms the spacer required from underneath the seat to the top of the kerb; the fluted tubing taken off old fire-irons will come in for the supports, if you may have any by you. The seats, drilled and bolted to the kerb, may be upholstered with flocks and finished with Rexine or leather to choice. Brass studs round the sides finish the task, and the result is a good-looking kerb, useful as well as being up-to-date.



Modernising a Brass Kerb.

BRUSH-WASHER AND OIL-SLANT

A very useful brush-washer can be made out of an old square tin such as the better quality tea is sold in. First of all make two straight cuts with a hacksaw, one on each side of the tin, as shown running from A to B. Then with an old but strong pair of scissors cut away the tin about the angles until only the portion shown in the lower figure is left, with the projecting lugs corresponding to CA and DB.



A Brush-washer and Oil-slant.

Screw down the tin by these lugs on the simple wooden stand shown, and arrange the height of the "rest" at the back so that it holds the brushes at the right slope with the hair resting in the corner of the tin. If made with the angle shown it will be found that quite a number of brushes can be soaked and cleaned with a minimum quantity of turpentine.

If there is no time to clean the brushes and they are required for use on the following day, then a little poppy-oil (or other slow-drying oil) can be substituted for the turpentine.

BURGLAR ALARMS

The wiring up of a fixed skylight to a burglar alarm can be done in two ways, either by a series of wires or by a wire grid-plate.

Some would prefer the grid-plate idea, since such a panel fitted underneath a roof-light could hardly be taken out without causing the alarm to go off.

With the wire system it is just possible that if roof-light glass was cut or broken, or what is more likely to take place, when the putty has been removed and the glass taken out, the removal of the glass would show the wires, with the result that wire would be cut and the alarm cut off for this time.

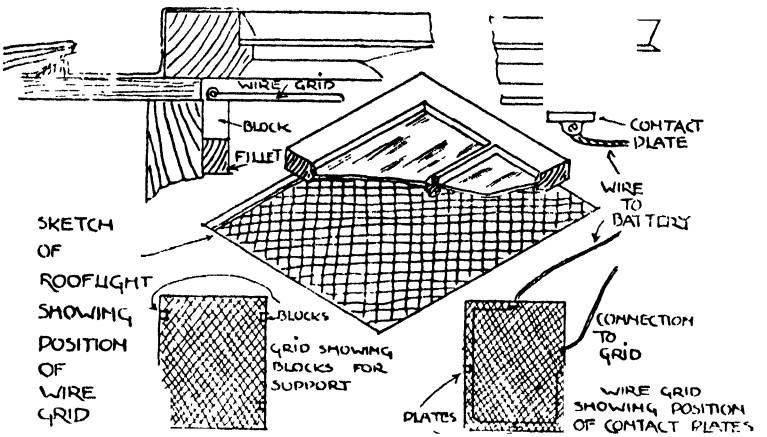
The presence of the grid would not convey to the burglar that it was there for alarm purpose, as it might be something which was there to prevent the roof-light being broken from the inside. At any rate, with the glass out the grid panel would require to be removed, and it would be almost impossible to take out the panel without causing it to touch one of the contact plates.

The merest touch of any of them would cause the alarm to ring.

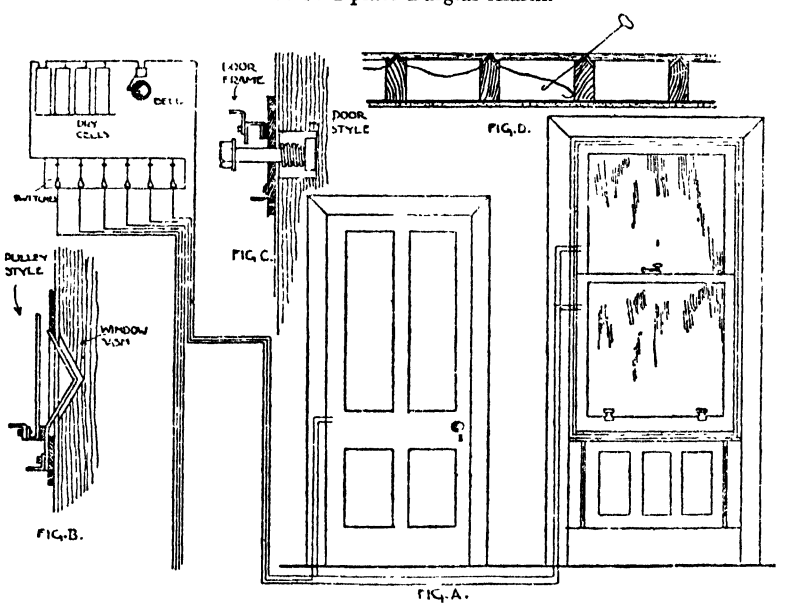
To fit up the connection, fix a fillet round the opening of the roof-light and on to the fillet the supporting blocks are nailed. The wire grid is supported on the four blocks which are shown in the sketch, while the contact plates would be arranged one on each side of the opening, so that it matters not where the grid was touched, one of these plates would be touched by the grid.

The four plates are wired up to the system as shown in the plan.

The accompanying drawing shows how a burglar-alarm system for doors and windows may be fitted up in any house.



A Wire Grid-plate Burglar Alarm.



A Multiple Electric Burglar Alarm.

Fig. A.—System of Wiring and Position of Connections for Burglar Alarm.
Fig. B.—Contact Spring for Sliding Window.
Fig. C.—Contact Plunger for Door.
Fig. D.—Method of Threading Wire between Joists.

It is even more simple to fit up in a new house because free access can be had in that case to the space between the joists and behind the window and door frame.

Concealing the wires in an old house from the switchboard to the doors and windows and back to the batteries is a simple matter.

They can best be carried along underneath the floor, and an easy way of taking them from joist to joist is shown in Fig. D.

Immediately on the top of each joist to be crossed a ½ in. hole is bored.

The holes are exactly on the centre of the thickness of the joist and are bored at an angle of 45° first to the right and then through the same centre to the left.

Immediately all the holes have been bored the wire is threaded through the first hole in the direction it is to travel.

The wire is then fished for through the next hole with a pull wire, and the operation of threading and fishing goes on until the wire has been connected up.

The system which is shown in Fig. A requires sufficient bell wire to connect up the windows and doors and return to the switchboard, a continuous ringer to operate the alarm bell, a 4 in. alarm bell for inside the house, a switch for each window and door connection, a window contact and a door contact for each protected fitting, and four dry batteries.

Fig. A shows how the system is set, with the four dry cells on a shelf, and the six switches on a wood panel below, the wires leading through the house being hidden as much as possible.

In running them through a first or second floor, the sketch in Fig. D shows how they are laced across the joists, and when the carpet or floor-cloth is laid the holes used in the fishing for the wire are covered up.

The wires are brought to the contact spring on the door standard.

Fig. C shows how the door spring is arranged when the door is shut.

When the door is opened the plunger springs out, making contact and completing the circuit.

In the case of the window the contact spring is sunk into the pulley style of the case.

The contact spring projects into the notch made in the sash so that when the sash is moved up or down the spring is forced back against the contact plate and completes the circuit, Fig. B.

Both upper and lower sashes in windows should be protected.

CLOTHES AIRER, FOR MANTELPIECE

A simple and easily stowed away clothes airer that can readily be fixed to any size or thickness of mantelpiece or shelf is illustrated in Figs. A and B. It is easy to make and requires no clamping screws of any kind.

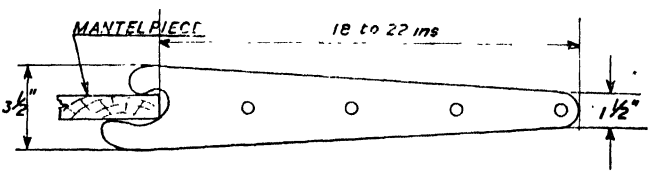


Fig. A.—Mantelpiece Clothes Airer.

The airer consists of two identical side supports of the shape shown in Fig. A, and of approximately the overall dimensions there given. These members can be made of pine, deal, oak or any other timber which will not split under its (light) load.

The shape of the left hand side of each support is such that the lower tongue is longer than the upper one, so that the arm rests, as shown, under its own weight. Moreover, the thickness of the shelf will not matter since with a thinner shelf the side support will hold equally well but will tilt downwards a little. The side supports should be about $\frac{3}{4}$ in. thick, all along.

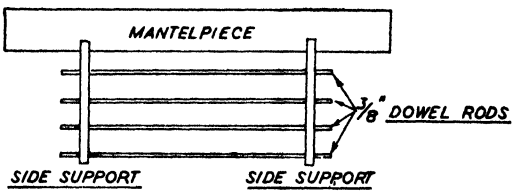


Fig. B.—Plan View of Mantelpiece Clothes Airer.

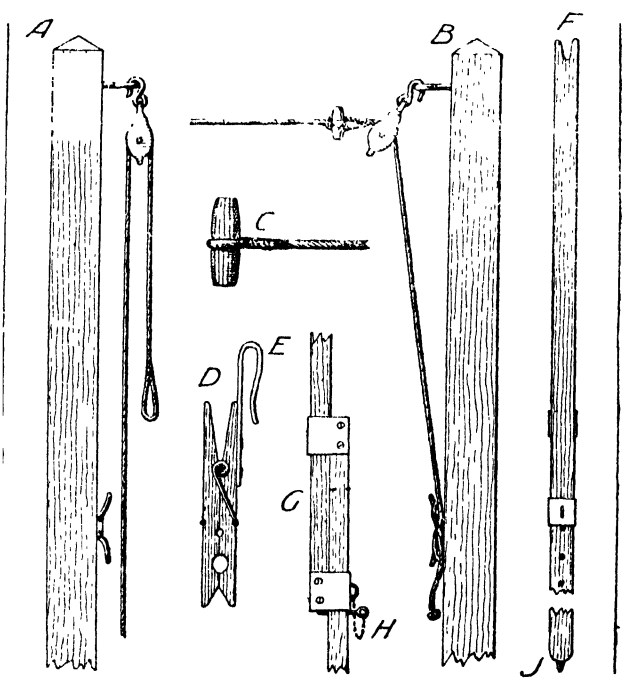
A series of four equally-spaced $\frac{3}{8}$ in. clearance holes is bored through each side support and through these are slid $\frac{3}{8}$ in. wooden rods such as those used for curtain rods. For portability the rods can be made a push fit in their holes so that when the airer is not in use the rods can be pulled out and then packed away with the side supports, the whole being tied or strapped together.

For a permanent clothes airer the rods can be glued and pinned diagonally with brass brads.

CLOTHES-LINE FITTINGS

Many devices have been suggested for the domestic clothes line, all more or less efficient, but the arrangement illustrated meets every requirement and gives no trouble. A and B are the two posts. Into the top of each is fixed a stout galvanised screw-eye. Two galvanised pulleys as shown are procured and hitched into the eyes. A length of cord is reeved through each and at one end provided with a spliced eye, the other end being finished with a Turk's-head knot to prevent the strands becoming unlaid.

The line is a separate component, and at each end has spliced to it a wooden toggle, shown enlarged at C. The line, which always should be kept under cover, when required for use is connected with the hauling cords and pulled taut, the latter being made fast to



Some Useful Clothes-line Fittings.

the iron cleats shown. If preferred, one of the cords may be provided with a spliced eye at its end, to be hitched over the cleat, the tension being put upon the line from the other end.

The cord used for the line and haulage pieces should be of hemp, as used for yacht's rigging, procurable at a ship-chandler's, where also the pulleys and cleats may be purchased.

The wire which is mostly used is galvanised iron wire, which after a time will rust in places, communicating to the linen the stains known as "ironmould." D shows the ordinary American clothes peg to which a hook of strip brass has been secured. A sufficient number of such pegs is provided and readily may be slipped on to the tensioned wire line, the clothes being gripped by the business end of the peg, and thus never being brought into contact with the line itself.

F shows an extensible clothes prop consisting of two lengths of 2 in. by ¾ in. worked deal coupled together in the manner shown by the brass bridge pieces. A series of ¼ in. holes at 3 in. intervals provides for fixing the two components by means of a pin as shown in the enlarged view at H. The foot of the prop may be furnished with a metal spike as shown at J.

COLD CHAMBER

A cold chamber for the preservation of food may be constructed as follows :

The carcase work can be done, as shown in the accompanying figures, by framing up the sides, top, and base separately and screwing them

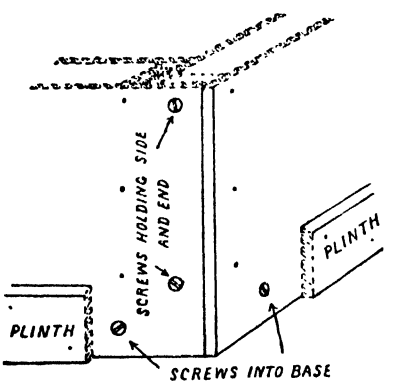


Fig. A.—Cold Chamber: Perspective Detail of One Corner at the Base.

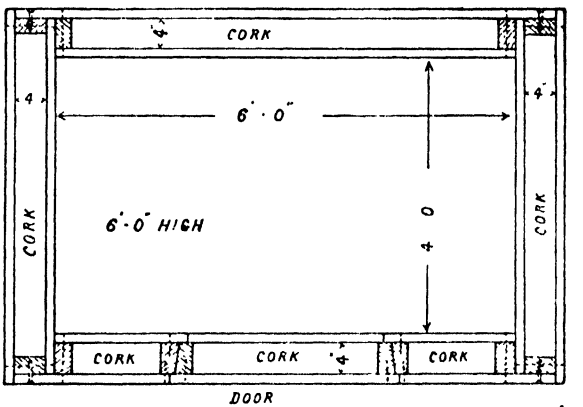


Fig. B.—Sectional Plan of Back, Front, and Ends screwed together, One Screw being Indicated at Each Corner.

together after. The frames are of 2 in. by 4 in. deal, rebated at the joints and nailed together, the outside being covered with ¾ in. matchboard, or plain tongued and grooved board, or thick plywood or wallboard. The cork is then put in the spaces and covered with tongued and grooved board, plywood or wallboard, or sheet metal. The base

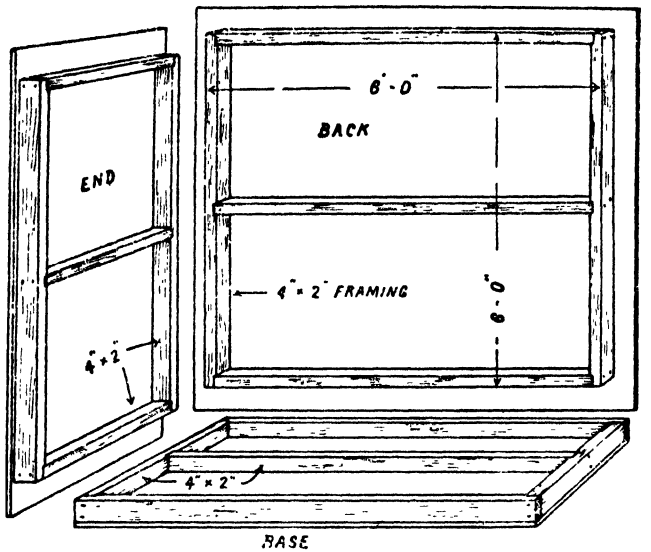


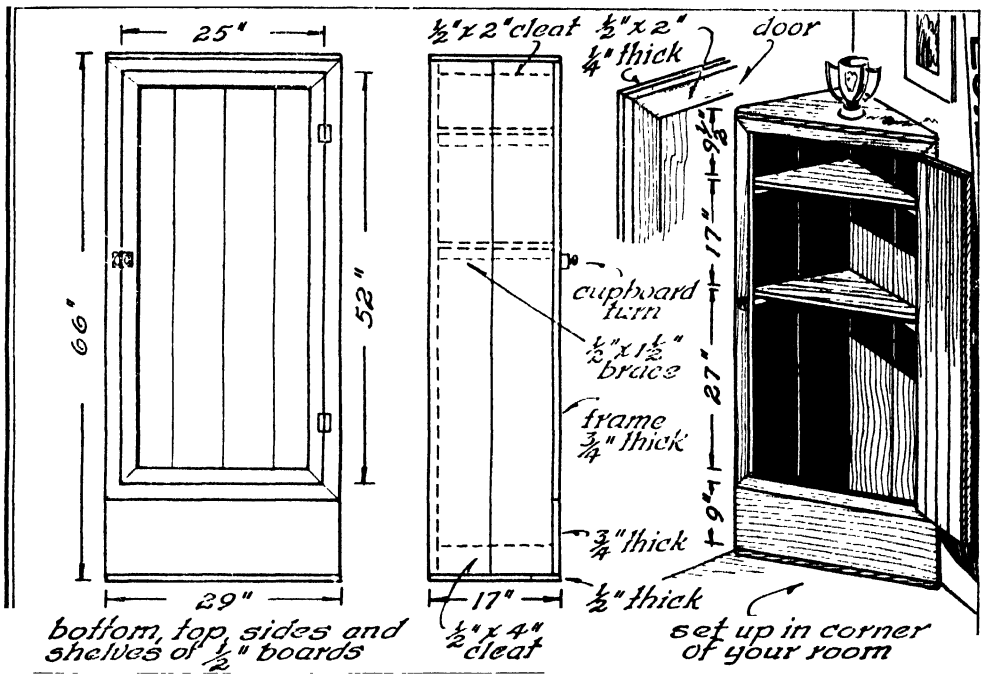
Fig. C.—Three of the Six Parts in Position for Assembling but without Cork on Interior Covering.

should have 1 in. tongued and grooved floorboards on top. Insulated paper is generally laid between the cork and its covering material. The parts will be made to fit each other, as seen in the views, and can be held together by screws through the overlapping parts, as indicated. A plinth can be nailed round the base and a cornice at the top if desired. The exterior may be painted and varnished, and the interior painted and white enamelled. Shelves will be fitted inside. The door may be central in the front, as seen in the plan. Its edges are bevelled, and it needs to be a close fit when fastened, the fasteners used being of a kind which press it into tight contact.

CORNER CUPBOARD

This corner cupboard will provide room for tennis, football, hockey, and other sports equipment, magazines, or other things which one wants to stow away in a handy place. Make it from one or two large packing-cases, which can be procured from a local tradesman for a small amount if there are no boards large enough about the place. The cabinet is triangular shaped so that you can fit it in one corner of one's room or den, and one can make it easily with saw, plane and screwdriver or hammer. Make the sides first, each piece being formed from two boards each $\frac{1}{2}$ in. thick, 10 in. wide and 65 in. long. Fasten the two boards together with a $\frac{1}{2}$ in. by 2 in. cleat at the top and a $\frac{1}{2}$ in. by 4 in. cleat at the bottom, making the other side section in the same manner. Plane the edges of the two sections where they join at the back, so that the front edges will be 29 in. across. Plane the front edges so that the door and frame will fit squarely across the front. Nail or screw a board $\frac{3}{4}$ in. thick and 9 in. wide across the front at the bottom end, the ends of the board coming even with the sides of the cabinet. Saw out boards $\frac{3}{4}$ in. thick and 2 in. wide for the frame, those at the sides being 56 in. long and the top and bottom pieces being 29 in. long. Saw off the ends at right angles as shown, to form mitred corners, and nail the frame together. Fasten it to the front edges of the sides, the lower end of the frame resting against the bottom panel board. On the inside of the cabinet fasten $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. boards

to support the two shelves, which can be set at desired positions. The shelves can be sawed from plywood or thin boards and the edges nailed to the supporting wood strips. The door consists of a frame made from boards ½ in. thick and 2 in. wide, with boards ¼ in. thick nailed across the back of the frame and sawed off flush with the edge of the frame. The door frame measures 25 in. wide and 52 in. high, and is made in the same manner as the outside frame attached to the cabinet front. Plane down the top, bottom and sides of the door so that it will fit in the outside



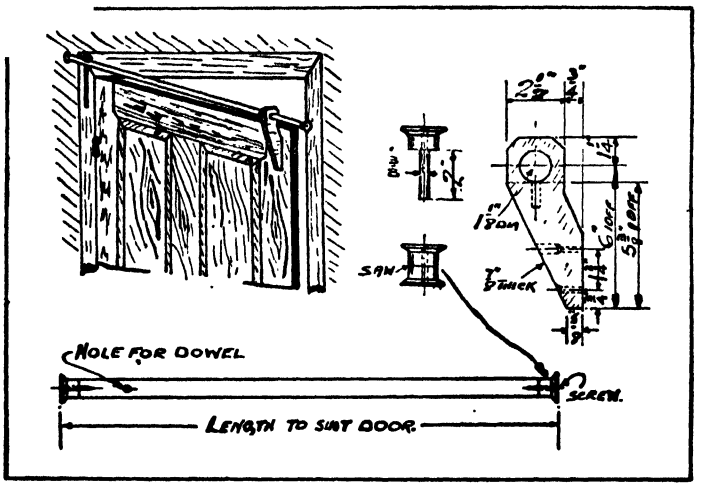
A Useful Corner Cupboard for Sports Gear, etc.

frame and then secure it at one side with metal cabinet hinges as shown. Fasten the small part of a cupboard latch to the outside frame and the other part to the adjoining door frame, so that you can easily latch the door in place. Nail boards to the top and bottom of the cabinet, cutting off the ends even with the cabinet sides. Sand-paper the cabinet inside and out, and stain it brown, finishing with clear varnish if you wish, If you want brighter colour, paint the cupboard. Add some nails or hooks to the inside walls, for hanging up clothes or articles. The compartment at the bottom will provide enough room to stow a lot of stuff.

CURTAIN HANGER FOR DOOR

This readily made curtain hanger has for its main parts a broom shaft, two empty cotton reels, and two pieces of hard wood for the

brackets. Cut shaft off to suit width of door, plus a small extra length at the ends, enough to carry one curtain ring, thus making the curtain when hung cover the door joints. Shape two brackets as sketch, one with large hole (door bracket) and one finished flat on top and bored vertically to receive a $\frac{3}{8}$ in. dowel pin. Saw the reels into halves; one half requires a dowel fitting; two more are wanted for the rod ends. Mark off a hole in the rod to receive dowel and let it work loosely, for the shaft or rod swings on this when door is opened. In the bracket the dowel can be a push fit. Bore brackets for two screws each. Before finally erecting, sand-paper all details and stain or paint to match door. Rings are obtainable of right diameter to fit an ordinary broom shaft. When completed, it is an effective and inexpensive fitting for the home.



An Inexpensive Door Curtain Hanger.

CURTAIN HINT, A

To prevent a door curtain getting underneath the door when opened, the following plan is most successful. Put a screw-eye in the centre of the framework of the door, and another one just below it on the door. Fasten a piece of cord to the top eye, draw it through the one on the door, and fasten the other end to the centre of the curtain. When the door is opened the cord is raised, also the curtain, which hangs in graceful folds instead of wedging itself under the door.

CURTAIN-LIFTING DEVICE

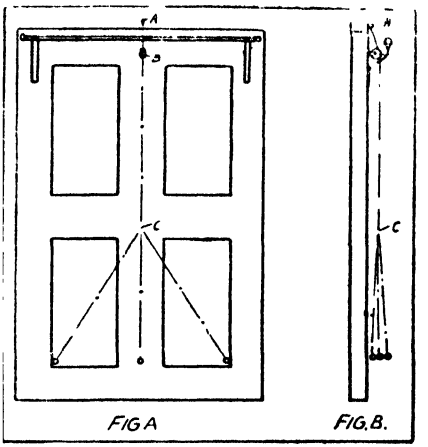
When a portière rod for curtains has been fixed, if the curtain is long enough to allow a few inches to lie on the floor it will exclude draughts coming under the door; but this in the ordinary way would necessitate the curtain being lifted up and fastened when anyone needs to pass in and out of the room.

If the simple expedient shown in the accompanying illustrations is adopted, this inconvenience is removed, and the curtain is raised from the floor and lowered again each time the door is opened and shut.

In about the centre of framing above the door is inserted a small

screw-eye A, Fig. B, to which a length of cord is attached. This cord is passed over the pulley B, Figs. A and B, fixed in the top of the door itself, and is continued underneath the curtain to C, where it is joined to three other cords terminating in three small rings sewn to the inside of the curtain about 1 ft. or so from the bottom.

Thus every time the door is opened the curtain is raised by the strings pulling it upwards. A modification of this plan is to have, instead of the rings, a thin lath sewn inside the curtain to which two cords only are attached.



A Curtain-lifting Device.

CURTAINED WARDROBE OR SUIT RACK

Where wardrobe accommodation is not available this suit rack, with its protecting curtain, will serve as well. It is far better than hanging clothes over chairs or decorating the door with them, and is a good and inexpensive substitute for a more expensive wardrobe. The simplicity and cheapness of the article are worth noting as it can be made for a fraction of the cost of the wardrobe it is intended to supplant.

Deal, 1 in. thick, is a good and cheap wood to use for making. Fig. A shows the front board, drawn over 1 in. squares. This can be copied direct on to the wood. Cut to shape with a bow saw and clean up the rough edges with file and glass-paper. At each end cut out the notches A and B. These are as wide as the thickness of wood used for the end pieces of the rack.

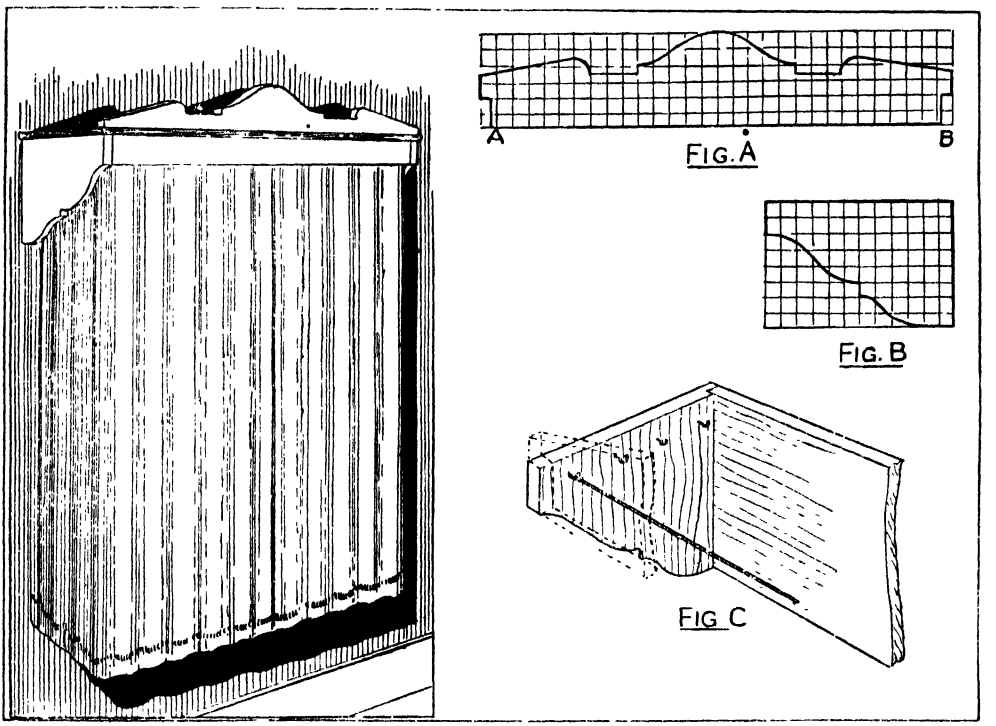
These end pieces are also drawn over 1 in. squares in Fig. B. The shape is quite a simple one, easy to cut with the bow saw. A coarse fretwork blade might do the job. but careful cutting would be necessary to avoid breaking the blade. A coping saw might also be used if no bow saw is handy. The end pieces are rebated to receive the backboard of the rack. Cut the rebate $\frac{1}{4}$ in. deep.

Cut the backboard to correct length, this length being that between A and B. plus $\frac{1}{4}$ in. each end to enter the rebates. Glue and nail the ends to the backboard and fix the front board across and nail also. Thinner boards can be used to cover the rack in across the top, say $\frac{1}{2}$ in. Nail these in place, and where they butt against the front board glue two or three blocks of wood in the angles. The end edges of the boards are hidden at each end by nailing and gluing over them either a moulding or plain slip. A similar slip is also continued across the front board to divide the pediment portion from the lower part.

Clean up the wood, and either stain and varnish it or paint it, preferably to match any existing furniture. In the backboard screw in a row of suitable hooks on which to hang suits, etc. Now for the protecting curtain.

This will quite likely be a feminine job and can be safely left in the hands of a lady member of the household. The length of the curtains can be anything up to say 4 ft. to 5 ft. Two are required, and each should be wide enough to cover not only half the width of the rack but also the depth, with allowance for a little fullness.

The curtains run on a spring rod, fixed a little behind the front board, as shown in detail, Fig. C. The runners for this rod can be bought cheaply



A Curtained Hanging Wardrobe.

at any hardware stores. Fix them to the curtains at about 4 in. apart.

Note: the runners are only fixed to that part of the curtains covering the front. The parts to cover the ends are provided with rings instead.

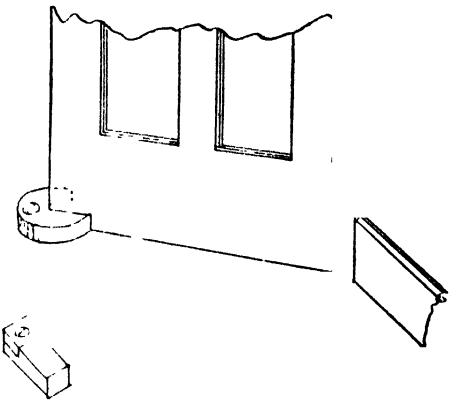
Now fix the curtains on the rod and drive in the requisite number of hooks on which the rings of the curtains can hang. The hooks may have to be a little lower than the spring rod, otherwise the ends of the curtains may be hitched too high and hang unevenly.

It is important to fix the rack firmly to the wall. As many walls are not particularly good for receiving nails with real security, the holes should be plugged beforehand. If brass wall plates are used, which can be screwed to the backboard, the plugging job is quite a simple one.

Fix one plate near each end of the backboard, just as you would to suspend a picture, and to prevent the rack tending to tilt upwards when clothes are taken off the hooks, fix an additional plate at the middle of the backboard, at the bottom.

DOOR STOPS

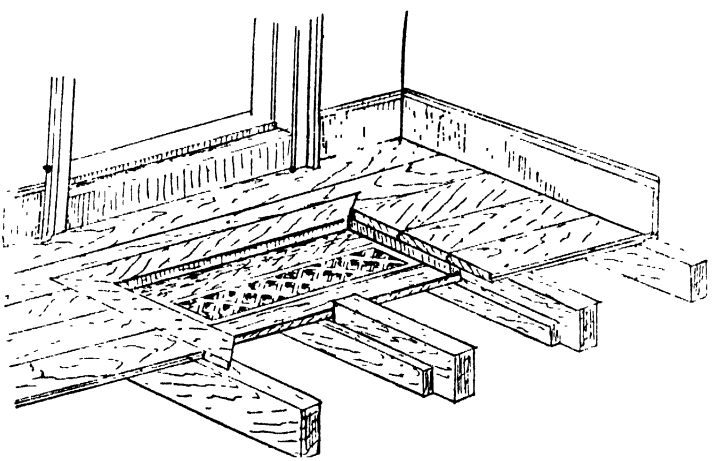
The accompanying drawing shows a gadget used for a door which it is sometimes needed to stop open, and yet can be easily closed. It is screwed to the floor, and the tightness of the screw determines the hold it has on the door. It will be seen that as one opens the door it automatically closes on it, whilst when the door is closed it leaves it in the ready position for receiving the door again. A large iron washer underneath raises it slightly from the floor or carpet.



A Novel Form of Door Stop.

DOORMAT RECESS

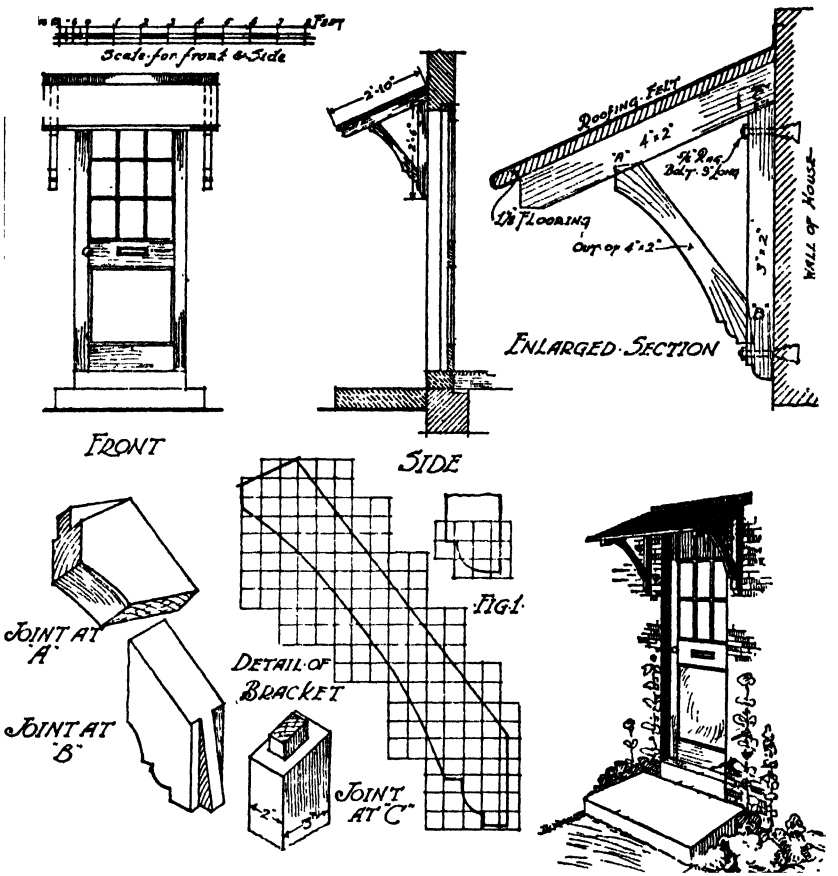
The illustration shows a mat recess with a ventilating grid fixed in the floor of it. The division wall of the lobby and front room is usually of brick, and as such it is necessary to build from the foundation. The path



Showing Construction of Recess for Doormat.

outside being a little lower than the floor inside prevents the insertion of an air brick, so essential to the ventilation of the space below the lobby and passage floor. This vital omission has resulted in floors so situated having to be renewed at an early stage. Were a grid to be placed in the

flooring itself it would be liable to be covered in the usual way with canvas, etc., but being placed in the recess means that only a mat—a more open article than canvas—will occupy the space, thus assisting ventilation. At convenient times, too, the mat may be lifted out, when it may be considered advisable to do so. The size of the mat is set out upon the floor space centrally with the door opening, allowing $\frac{1}{4}$ in. all round for possible expansion due to traffic. The position of the joists



Illustrating Construction of Door Hood.

may not be so favourable as illustrated, still the method of cutting out that portion of the existing flooring is the same. Having located the position of the end joists by the nail heads as may be seen, and by which the flooring was nailed down, commence by boring a hole or a series of holes by means of a $\frac{1}{2}$ in. centre-bit. The insertion of a saw blade through the holes will enable a clean saw-cut being made, when the boards may be prised up. For an improved appearance an oak frame may be used as a surround to the recess.

DOORWAY IMPROVEMENTS

The drawings on the preceding page show a simple door hood which will be found extremely useful in inclement weather, both as a protection to the door and as a shelter for callers.

It has the advantage, also, of adding greatly to the appearance of a bare doorway on the side of a house, for example. In this respect many of the smaller modern houses suffer from excessive plainness, in the matter of the design of side doors, so that the door hood described will be welcomed.

It has the further advantage of being inexpensive and easily made.

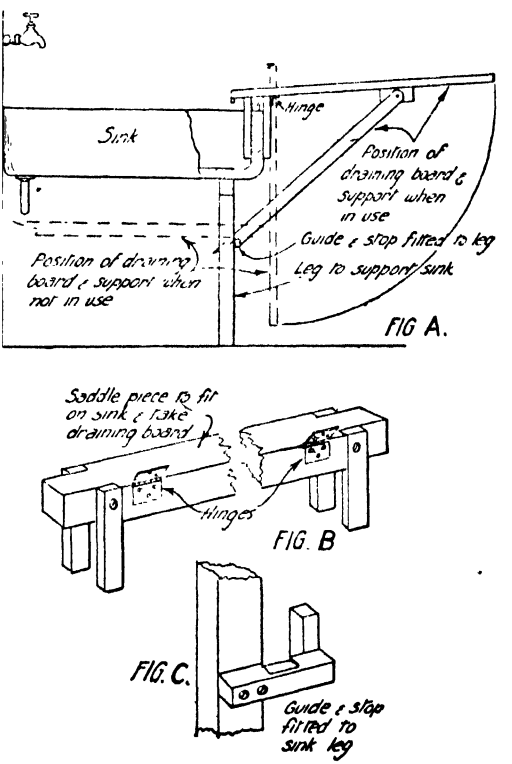
Construction.—The first thing to do is to make the brackets out of oak or red pine to the sizes marked on the drawing. These brackets are framed together with joints as illustrated in the sketches A, B, and C of accompanying illustration and shaped according to the detail given, the end of the upright leg being moulded as illustrated. The joints should be well coated with white lead before being put together. When the brackets are made, they are fixed by means of rag bolts, $\frac{5}{8}$ in. in diameter and 9 in. long, which are let into the wall and run in with neat cement or molten lead. Flooring with the dressed side downwards is next nailed lengthwise across the brackets with the ends projecting about 3 in. beyond the sides and over the front. On this boarding is tacked roofing felt, which should be turned up where the boarding and wall meet and let into a joint in the brickwork which has previously been raked out to receive same.

If the hood is made in oak, it could be left natural colour or treated with oil; whilst if it is of red pine, it should be given three coats of oil paint to any desired shade.

DRAINING-BOARD

(1) **Fixed Pattern.**—The accompanying sketches show a simple and most efficient method of fitting a draining-board of a sensible size, where the economy of space is an essential feature.

Fig. A shows the arrangement, which is very simple. The board is



Constructional Details of Fixed-type Sink Draining Board.

hinged to a saddle piece, shown enlarged in Fig. B, which fits on sink; a block is screwed to under side of board to which the support is pivoted by means of a screw; the lower end of the support is notched to rest on the stop, which is screwed to the leg supporting sink, as shown in Fig. C.

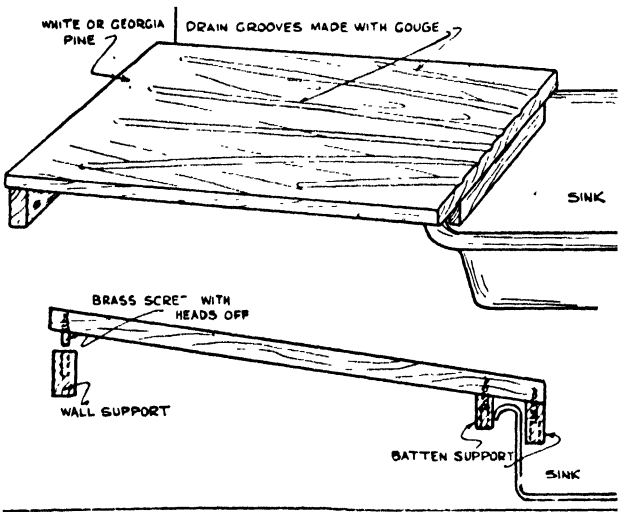


Fig. D.—Detachable Draining Board.

As will be readily seen, when not in use the board is vertical and the support rests horizontally on stop guide piece; when required it is only necessary to lift up the board and the support will automatically drop on stop when it reaches the notch. The whole lot can be removed from the sink by lifting board and saddle piece. No dimensions are given, as it is a matter of varying sizes of sink, height from floor, etc., but it is so simple that a few minutes' experiment will decide the position of support, guide, and stop.

(2) **Detachable Type.**—A simple and inexpensive draining board, which is of a special size and detachable readily from the sink, is illustrated in Fig. D.

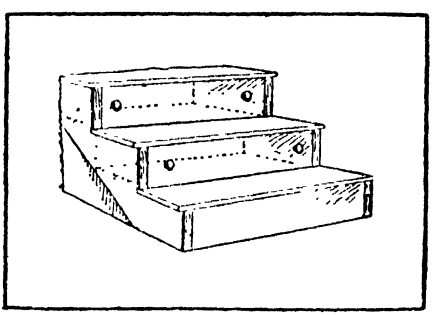
The draining board is made from a short length of Georgia pine, one piece of wood 14 in. wide and 1 in. thick.

The board secures to the sink, through use of two small batten-like braces on the bottom. The opposite end rests against a simple wall bracket, into which two small holes are bored. Two brass screws with heads cut off fit into these holes. Drain grooves are laid off with a pencil and cut in with a hand gouge, these being made about $\frac{1}{8}$ in. deep.

The wood is left in the natural state, without painting or oiling.

DRAWERS IN STAIR STEPS

Where space is limited in the modern bungalow or cottage having second-floor rooms, drawers may be constructed to enter the riser on each step (see accom-

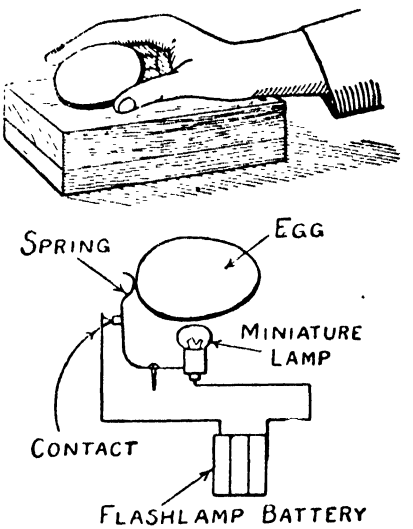


Handy Drawers Made in Stair Steps.

panying illustration), and used to store many articles not in everyday use. The drawers should be snugly fitted in the openings to keep out the dust. After using the drawers, care should be taken to close them again

EGG TESTER

It is well known that the condition of a hen's egg can be ascertained by holding it up to the light. An improvement on this method, which enables a large number of eggs to be tested rapidly, consists in fixing a flashlight in a box, as shown in the illustration, in which are placed the flashlight battery and an ordinary 3·5 volts bulb. The act of placing the egg over the aperture shown is to switch on the current and light the bulb. Immediately the egg is taken away the light automatically goes out. This method possesses the advantage of obviating holding the egg to eye level.

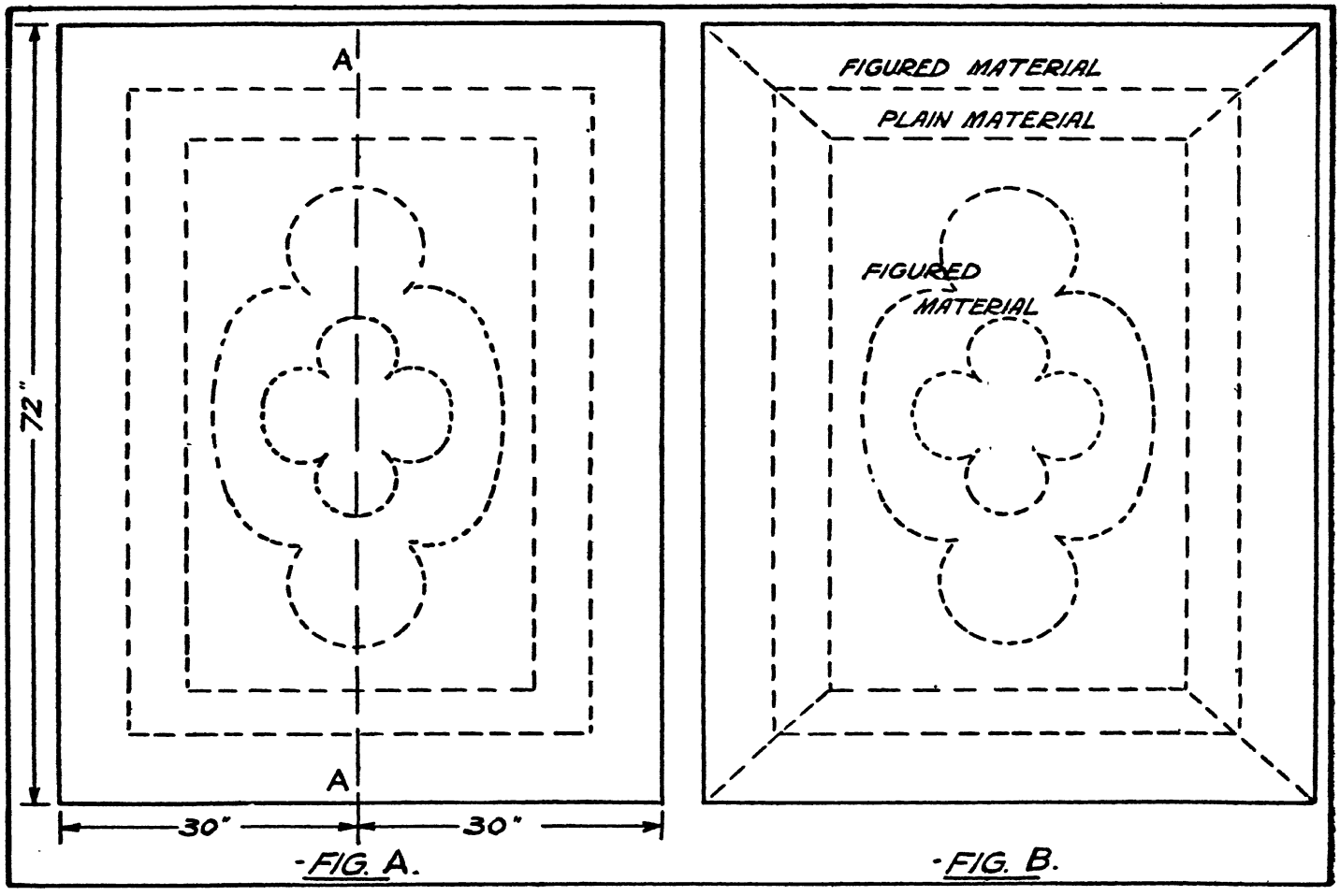


Electric Egg Tester.

EIDERDOWN QUILTS—RECOVERING AND REPAIRING

Before doing anything to a worn eiderdown it should be carefully examined to find out whether it cannot be repaired without removing the down, for if it can, much time and trouble will be saved. It may be found that most of the covering is good, only one or two places requiring attention; in this case a piece of new material to match the old can be cut to coincide with the quilting stitches, i.e. those which go right through to back of case, which surround the bad place. Enough margin is allowed for turning under at the edges, and the new piece is sewn on over the old, the stitching following the line of the quilting stitches, and going right through to back.

For many repairs, however, and for re-covering, the down must be removed. This is accomplished by first unpicking all the quilting stitches at back of eiderdown. Fig. A shows the back of a typical eiderdown formed by two widths of material joined by the seam AA. This seam will not be unpicked, but all the other stitches appearing on the back will. An opening about a foot long is now made at one end of the case, and to this is stitched a large stout paper bag so that the down can be gently "pumped" and shaken from the case to the bag without any of it escaping. In filling an eiderdown the same method is used in the reverse way, the down being gently forced from the bag into the case. When new down is used, the bag in which it is bought is stitched to the case. The down having been removed, the old case can readily be dealt with on



Back of Eiderdown.

Front of Eiderdown.

similar lines to the making of a new case, turning the material where this can be done; or a new case is made as follows:

Making a New Case.—The material used is mainly satin or sateen, 30 in. wide. Downproof material is best, but ordinary material can be rendered downproof by soaping or beeswaxing the reverse side. The simplest case to make is a self-coloured one, top and bottom being made

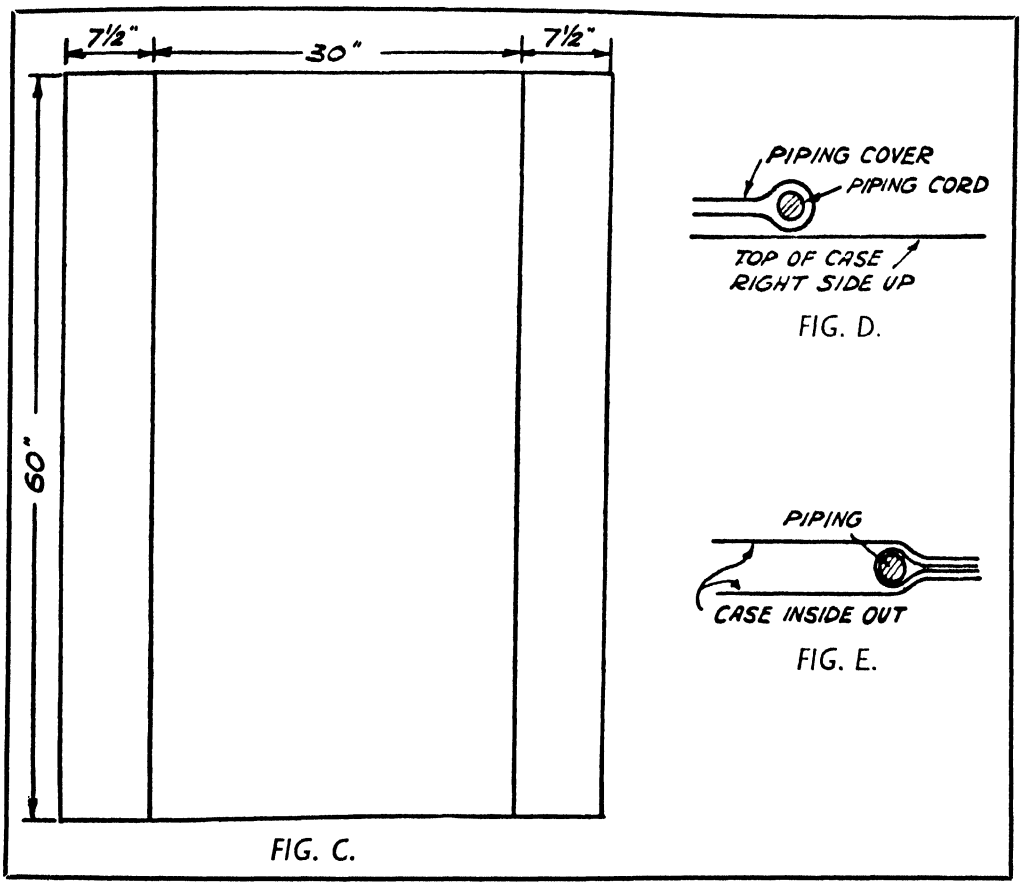


Fig. C.—Top and Bottom of Simple Eiderdown Case. Fig. D.—Attaching Piping to Top of Eiderdown Case. Fig. E.—Second Stage in Attaching Piping.

on the lines indicated by Fig. C. A centrepiece of figured material or patchwork can be sewn on above the other material if desired. In Fig. B the top of case is made of nine sections machined together, the middle section being a single piece of the same design as the outer panels, which have mitred corners, as also have the inner panels which are plain.

The piping cord is covered with a series of strips of material, and pinned to the right side of top of case as shown by Fig. D. The whole is then turned over, laid on the bottom half as in Fig. E, machined round with

the exception of 18 in. at one end, and then turned right side out. After the down has been inserted, the opening is sewn up by hand, and the lines of quilting machined. In the case shown by Fig. C, lines are drawn across at ends, and these are quilted to correspond with the inner side seams which are also quilted.

FIRESCREEN

The inlaid firescreen depicted in Fig. A was made up with the sole purpose of masking a somewhat unsightly fireplace in a bedroom. It was made up in white ash, and contained a 5 mm. birch plywood panel which was inlaid with a fine purplewood line. There is, however, no reason why it should not be made up either in oak, walnut, satin walnut, or mahogany, so as to match any existing suite.

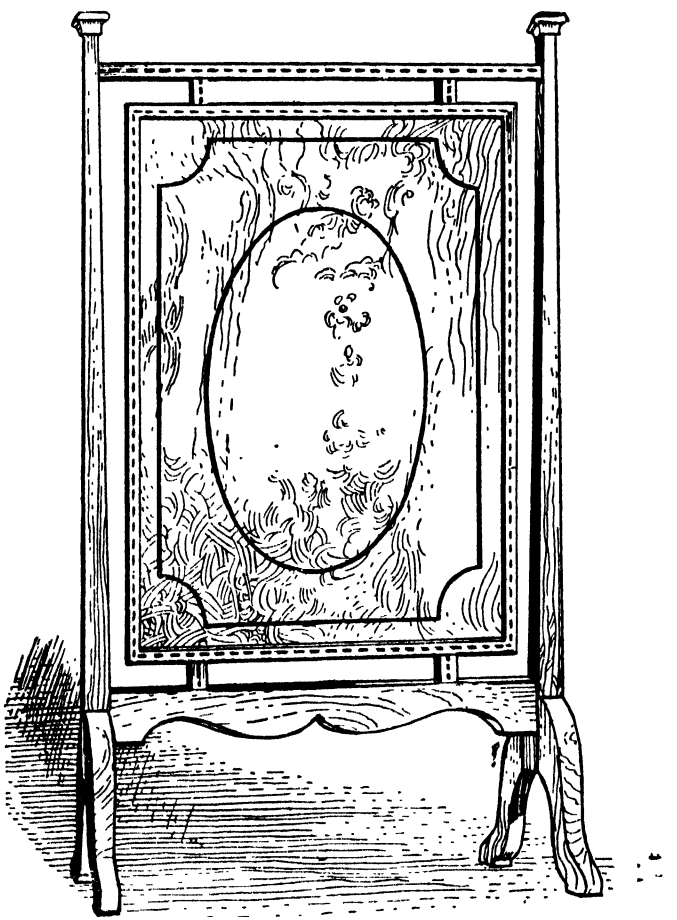


Fig. A.—The Finished Screen.

The total height of the screen is 2ft. 9½ in., and its overall width is 18½ in., with a spread of 8½ in. over the feet.

Inlaying the Panel.—The following notes of the procedure for inlaying the panel will no doubt be of interest to many workers.

A piece of 5 mm. plywood was made to the size of the ellipse, and this was glued securely down on the face of the panel with a sheet of white drawing-paper stuck between the panel and the plywood templet. This templet A, Fig. B, must be laid with pressure so that its edges are firmly bedded to the panel. Take a new bradawl and grind it to such a width that its blade agrees with the width of the purplewood stringing, and proceed to scrape out a channel for the inlaid line as follows :

Hold the bradawl handle in the right hand and allow the fingers of

the left hand to grasp the steel bradawl blade. Start at 1, and proceed to scrape out the recess (or channel), working always in the direction of the grain as indicated by the arrows. You will thus complete the channel for the inlay by scraping away the wood from four distinct starting-points. All that is required to make a neat, workman-like job is to keep the bradawl steady, and well in contact with the edges of the guide templet. When the channel is completed, insert the blade of a thin table knife between the templet and the panel. The paper will in this manner be split edge-ways, and the templet can be removed. Soak any paper that remains on the panel with warm water, and scrape it carefully away. Then put the panel aside to dry off. Soak the purplewood stringing in hot water, and steam it so that it will negotiate the bend. Then glue it into position and rub it well into the channel with the peen end of a hammer.

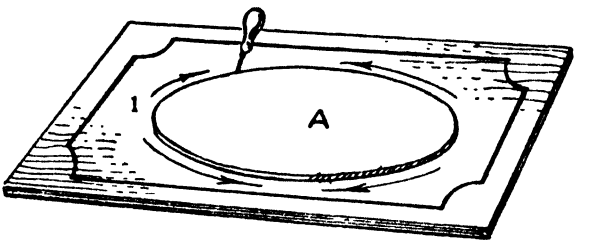
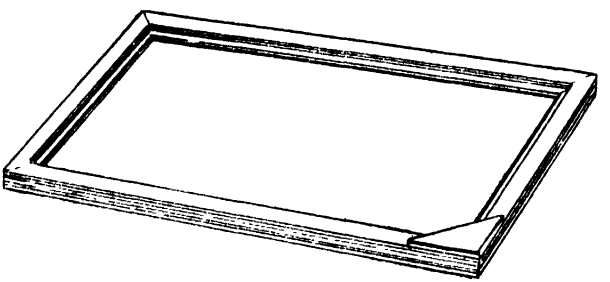
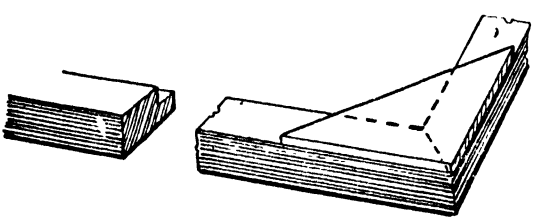


Fig. B.—Making the Inlay Oval.


Fig. C.—The Frame.


Fig. D.—Strengthening the Corners.

With luck you will be able to insert the stringing in two pieces. If, however, you have not selected straight-grained wood, you will have to lay it in four pieces, but the joints will not show if they have been cleanly cut. If you prefer to use Erinoid or Ivorine stringing, it will be found that it easily bends to the shape of the curve if soaked in hot water. The quarter-circle corners may be manipulated in a similar manner by making a suitable plywood templet; and the straight lines may be worked out with a scratch stock. The same bradawl blade that is used for working around the ellipse may be fixed into the end of an ordinary marking gauge, this making an excellent scratch stock for the purpose.

The Inlaid Frame.—The inlaid frame around the panel is mitred at each corner (picture-frame fashion), and cramped up by the string method. When the mitred corners have stood until the glue is dry,

make four pieces of plywood and glue them across the mitres at each corner of the frame, as suggested in Fig. C.

Fig. D shows an enlarged view of this. Drawing-paper must again be glued between the triangular plywood braces and the frame.

The object of these triangular braces is to support and hold the frame together whilst it is planed up, glass-papered, and polished. This frame is so lightly built that it is next to impossible to clean it up and polish it unless these precautions are taken, because its section only measures ½ in. by ⅝ in. thick. These corner braces are left on the work until the screen is completed, after which they are removed with a knife and the back corners of the frame are then polished up.

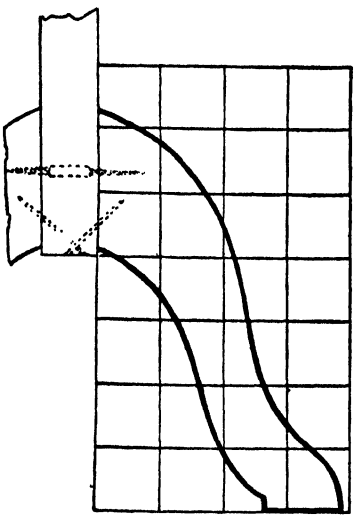


Fig. E.—Method of Setting Out Shape of Leg.

Fitting Panel into Frame.—The panel is beaded into the rebate of the frame with thin beads which have one edge rounded, the beads being secured to the frame with fine ½ in. panel pins in the accustomed manner.

Making the Legs.—The legs, or feet, are shown plotted out into 1 in. squares at Fig. E; and the method of securing these feet to the upright standards is by gluing them and using a double-pointed or dowel screw, as it is called. To prevent any possibility of these legs twisting on the dowel screw, two fine panel pins are skew-nailed from the under side of the standard, as suggested in the drawing. The legs are thicker at the top than at the bottom; in other words, they taper towards the foot. The short upright pieces which support the inside frame to the outer frame are dowelled into the outer frame, and screwed from the inside of the rebate of the inner frame. The shaped cappings on the top of the uprights are mortised and tenoned and glued into position.

The Materials Used.—The following are the thicknesses of the wood used:

Uprights, $\frac{15}{16}$ in., tapering to ½ in. Bottom shaped rail, 1½ in., by ¾ in. Top inlaid cross-rail, ½ in. across face and ½ in. thick. Four small inlaid supports to hold inner frame, ¾ in. by ½ in. thick. Frame around panel, ½ in. on face and ⅝ in. thick. Capping, 1¼ in. square and $\frac{9}{16}$ in. thick. Shaped legs, ⅞ in. thick at top and ⅝ in. at bottom. If the work is made up out of open-grained ash, it will pay to fill in twice with a paste filler, allowing, of course, plenty of time for each application of the filler to harden. If you do not wish to fill in twice on this open-grained wood, use a hard filler, as is the custom in the American workshops; that is, a putty filler which is forced into the pores with a putty knife. Finish the work by french polishing.

FLOOR POLISHER

The polished floor certainly contributes much to good health, and is now seen in every home where health is considered, as well as in hotels, business premises, schools, and other large institutions. Polishing is, however, a very laborious operation when it has to be done by a person in a kneeling position. The polisher shown (Fig. A) is very easy to make, and enabies floors to be polished quickly and with little exertion.

It has a bottom board A, to which the polishing cloths or rubbers are fixed by means of two battens. A polisher is much more efficient if it is

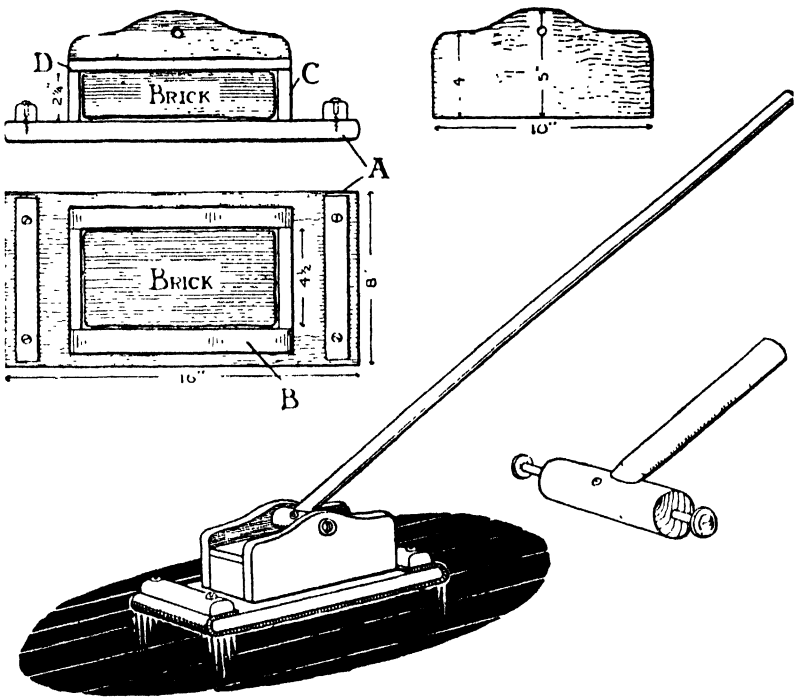


Fig. A.—A Useful Floor Polisher, Showing also Constructional Details.

weighted, and in this case a brick is enclosed between the sides B and the ends C, and is covered by the top D. The polisher is worked with a long handle fitted between the sides.

A hard-wood is best for making the polisher.

The Bottom.—The bottom A is 16 in. long by 8 in. wide, by 1 in. thick, with all edges slightly rounded. The battens under which the ends of the polishing cloths are fixed are 7½ in. long by 1 in. square, each being fixed with a couple of round-head screws.

Sides and Ends.—The sides B are shaped from 1 in. wood, as shown. The ends C are 4½ in. long by 2¼ in. wide by ½ in. thick, nailed between

the sides, and the top D is ½ in. thick, cut to fit between the sides and to extend over the ends, fixing being with screws or nails driven through the sides into the edges of the top, and through the top into the ends. Before actually carrying out this part of the work it will be advisable to obtain a brick, for some little adjustment may have to be made in the dimensions, as the brick should fit snugly into the wood casing. The parts are fixed together by driving screws through the bottom into the edges of the sides.

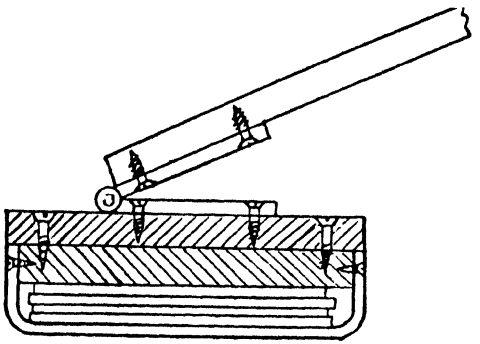


Fig. B.—Floor Polisher from Old Felt Hat.

The Handle.—The handle should be quite 4 ft. long by 1 in. diameter, and it is fitted into a 2 in. diameter cross-piece at the bottom end. The cross-piece is cut to fit between the sides, and is pivoted by driving two round-head screws through the sides.

The polishing cloth or rubber which is fixed to the bottom should be of thick stuff, and in using the polisher it will be found that another cloth may be placed loosely under this.

Alternative Type of Polisher.—An old velour hat may be converted into an efficient boot polisher quite easily, and a floor polisher is made in a similar way (Fig. B).

To make a floor polisher, some wood, ⅜ in. wide and ⅜ in. thick, will be required. Two pieces are cut, one about 6 in. long, the other ¼ in. shorter.

A cover piece may now be cut from the felt hat, large enough to allow for tacking round the smaller piece of wood, as shown.

Several pieces of felt are cut in strips for packing pieces.

By tacking one edge of the felt to the wood, then placing the packing into position and finally tacking the remaining sides, the pad is finished.

The large piece of wood is the top plate, which is supplied with a hinge to which is attached the broomstick or lever.

Small pads are made in a similar manner, being fitted with a grip in place of the hinge and stick. These may be used for boot polishing.

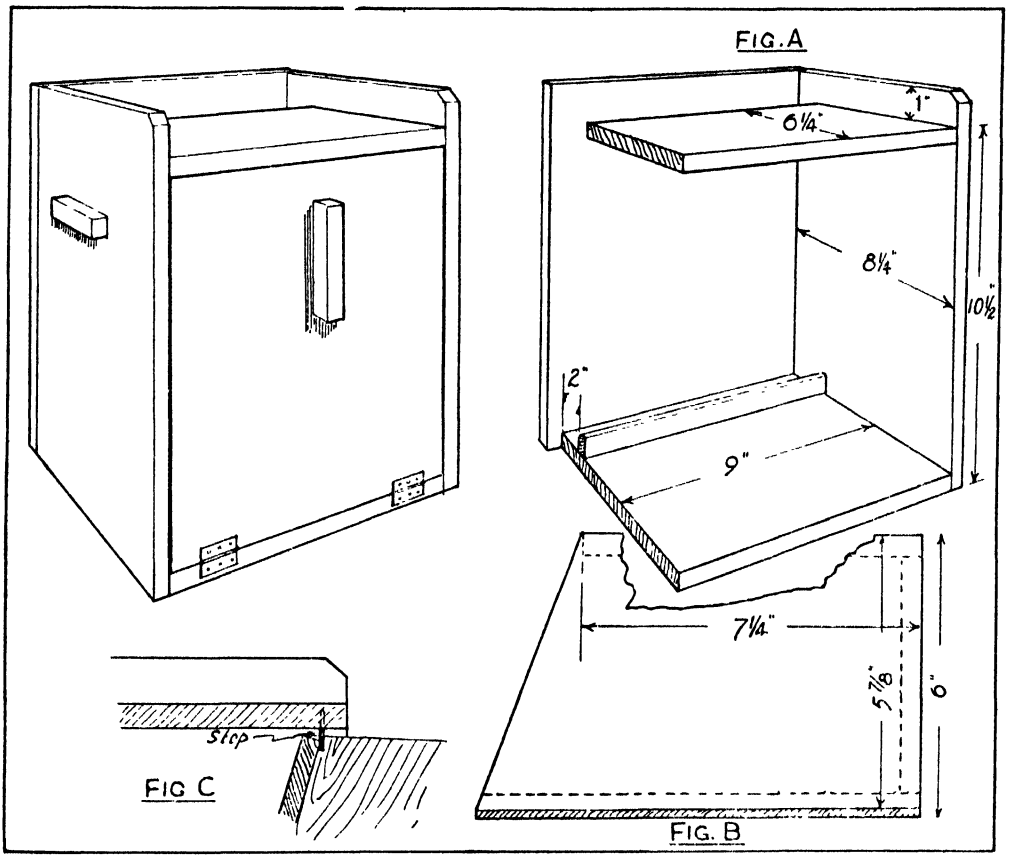
FLOUR BIN OF ORIGINAL DESIGN

For use in the home this somewhat unusual pattern of flour bin will be welcome. The container pulls forward; this allows the top of the bin to be used as a shelf. It is suggested that the household scales might stand on this shelf to be handy for weighing the flour. At the back is a narrow space where such articles as rolling pin and wooden mixing spoon could be accommodated.

The construction is quite simple, and no "shaping up" is required. For this reason the article would lend itself to mass production for sale.

White deal or whitewood, ½ in. thick, is suggested as a suitable and cheap material to use for making.

Fig. A shows a view, with one side removed, giving dimensions. Joining up can be just a matter of nailing with 1¼ in. oval brads. At the bottom, a strip of ¼ in. by ¾ in. wood is nailed across to keep the rolling pin, etc., from slipping forward when the container is open. It is not



Flour Bin Cabinet.

Fig. A.—Body of Bin, Showing Construction. Fig. B.—Side View, Flour Container. Fig. C.—The Stop.

imperative, and might be dispensed with if a number of bins are to be made.

Fig. B shows a side view of the flour container, the outline being broken to save space. Make the front to fit the opening, and rebate the side edges ¼ in. by ⅜ in. to receive the container sides. Plywood, ¼ in. thick, will do for these, nailed in place. Punch the nail heads down a little so as not to scrape the sides of the bin.

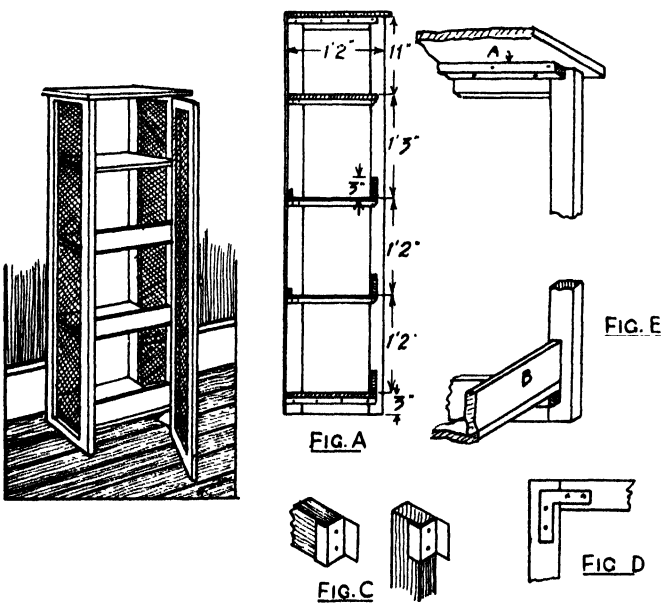
The back and bottom are both of ½ in. wood, the back being cut shorter than the front for obvious reasons. Hinge in place with 1¼ in. brass hinges. The handles are cut 3 in. long from ½ in. sq. strip and secured with glue and nails from the inside. Fit the side ones 3 in. from the top and the front one 1 in. from the top of the container.

A stop should be provided to prevent the flour container from falling too far forward. This is shown in detail, Fig. C. It is a wire nail or brass screw, driven in ½ in. from the edge. If a screw is used, file the head off. The stop should just catch against the back of the container, as shown.

For home use the bin might be white enamelled outside. If done, punch the nails well down, fill with stopping and apply a priming coat. Follow this with one of undercoating and finish with enamel. For sale, such wooden articles are usually left in the white, leaving it to the purchasers to enamel or not as they please.

FOOD CUPBOARD, DOMESTIC

A cupboard for vegetables, preserves, and other necessary food supplies for the winter is a valuable piece of household equipment. Ordinarily, something of the kind is part of the kitchen furniture of every country house, nowadays it can be equally important to the town dweller.



A Domestic Food Cupboard.
Fig. A.—Vertical Side Section. Fig. C.—Top and Bottom Fixing.
Fig. D.—Corner Plates to Door. Fig. E.—Templet for Dowelling.

The cupboard illustrated is made of deal. The sides are framed up from 1 in. by 2 in. planed battens. The joints can be dowelled instead of mortised and tenoned. This is an easy form of joint to make provided the dowel holes are correctly marked out. This can be facilitated by making a templet as a guide, cut from a piece of tin-plate. Dowels ⅜ in. diameter are used.

Height dimensions are given in Fig. A, but these can be amended to suit requirements, some will want a bigger cupboard than others.

Suitable width for the cupboard is 1 ft. 6 in. to 2 ft. Having made the

side frames, along the top and bottom of each nail 1 in. square battens, finishing short of the front edges by 1 in. to admit the door.

To these the cupboard top and bottom are nailed, as at A, Fig. A (top right). These are cut from matchboarding, or plain boards glued together. Matchboards save the gluing trouble. On the inside the frames are now covered with ½ in. mesh wire netting, perforated zinc, or safe wire gauze as preferred.

The top shelf can be cut from stout plywood, and fixed to side battens. At the front of the bottom shelf nail a 1 in. by 3 in. piece, B (Fig. E), across. Two more similar pieces are also nailed across at the height given in Fig. A. Now nail a three-ply back to the cupboard.

To the back, and level with front cross-pieces, nail strips of beading, or small section battening. The bottoms of the vegetable shelves, also of plywood, are nailed to these cross-pieces and beads from underneath. Nail strips of beading each side to help support the plywood. Now only the door remains to be made.

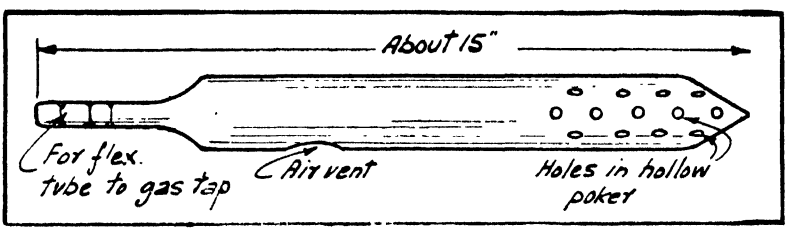
Frame this up from 1 in. by 2 in. deal like the sides, and strengthen each corner on the inside with iron plates, as in Fig. D.

These are known as repair plates, and can be bought at most hardware stores for a few pence. Hinge the door with 2 in. iron butt hinges, and fit a fastener of some kind (a button will do), also a knob. Tack over wire netting, or whatever else is chosen, on the inside.

This completes the cupboard. Painting it or giving it a coat of varnish, on the outside, is suggested; otherwise these bare wood articles soon present a soiled appearance.

GAS POKER

The gas poker illustrated here is ideal for the rapid lighting of fires



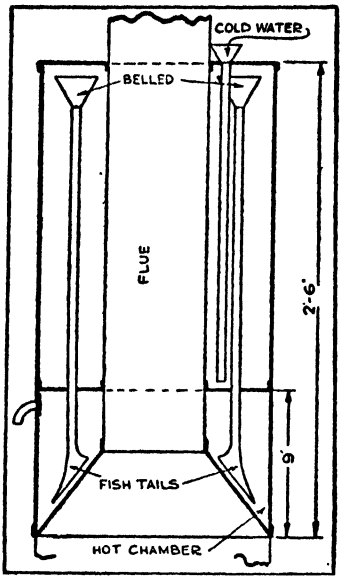
Gas Poker for Domestic Fires.

without the use of wood or paper. It can also be used for reviving a fire that has become deadened or dull.

GEYSER CONSTRUCTION

A geyser made on the following principle is quite effective and reliable:

The hot chamber should be as small as possible (in width). The outer shell is of 14 gauge copper joint brazed. The inner is slightly heavier.



A Gas Geyser.

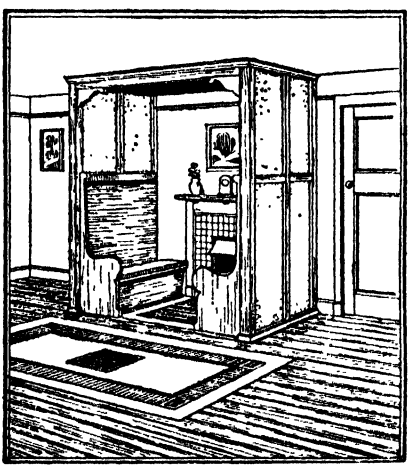
Cold water is run into top tank and rises and overflows into hot chamber by means of bell-mouthed tubes. These take the water, which is now hot, to the bottom of the hot chamber, where it boils and rises to outlet. The bottom of the cold feeds should be fishtailed to spread or spray. Cold-water pipe (from main) should go to an inch of bottom of top chamber.

INGLE NOOK

A cosy ingle nook is a pleasing and useful adjunct to a sitting-room, and the addition of such to an existing apartment can be readily carried out by the amateur if the construction illustrated and described in the following article is employed.

The plan, elevation, and the two sections give a general idea of the scheme and can be easily followed and understood, and although the dimensions given would prove suitable in most instances, these can be varied to suit individual requirements.

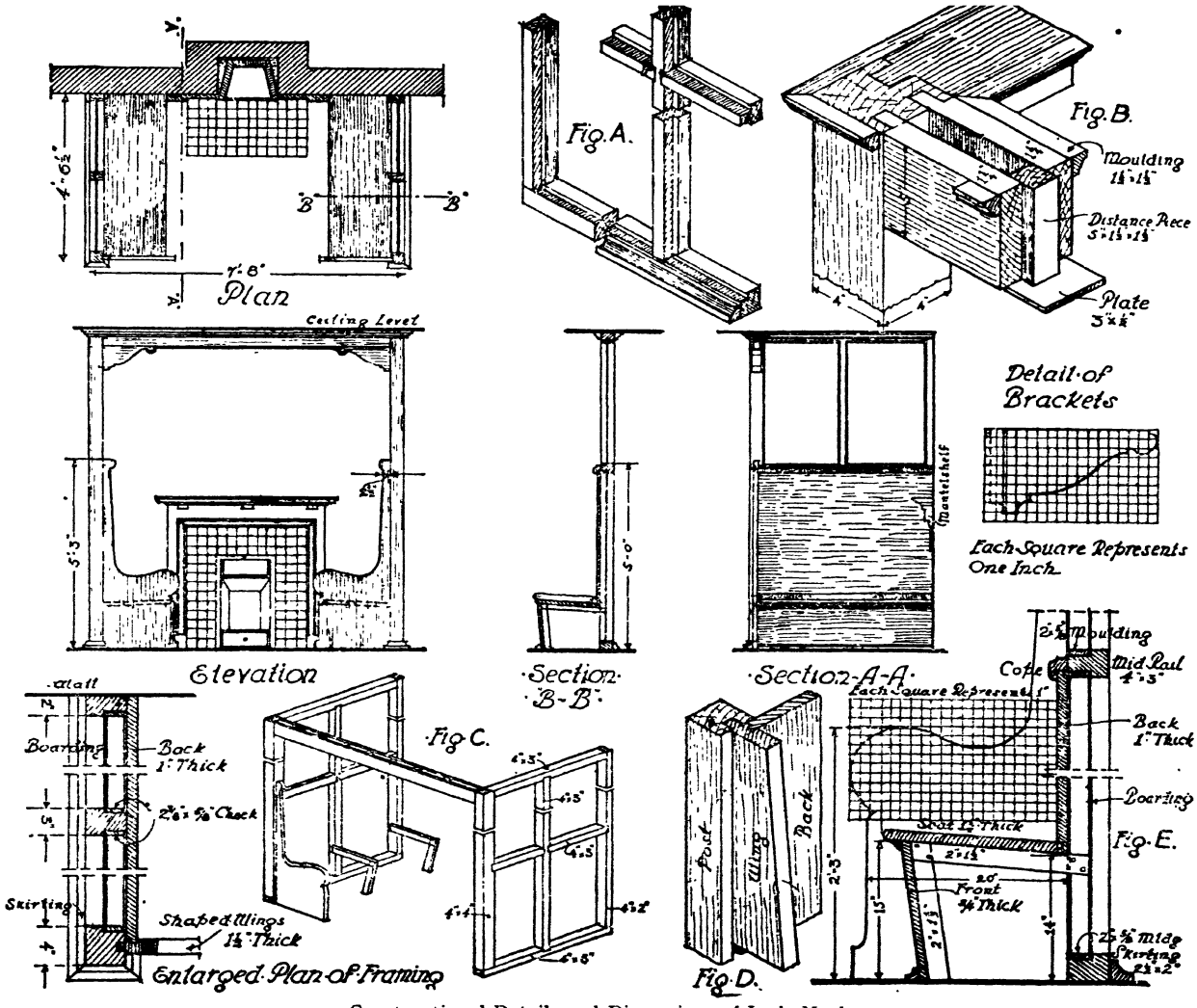
Constructing the Framework.—Fig. C is an isometric sketch of the framing required, part of which is shown in greater detail in Fig. A. Dealing firstly with this framing it will be observed that the sides are constructed of 4 in. by 4 in. angle posts, 4 in. by 3 in. intermediate posts, 4 in. by 2 in. wall posts, fixed to the wall by means of spikes or Rawlplugs, and 4 in. by 3 in. top, intermediate, and bottom rails. This framework is all wrought or dressed and jointed in the following manner: The corner and wall posts are stub tenoned into the bottom rails, whilst the top rails are tenoned into the former in the manner shown in Fig. B. The intermediate posts are housed into the top and bottom rails, and the intermediate rails housed into the posts, the bottom rails being securely nailed to the floor.



A Cosy Ingle Nook.

Checks $2\frac{3}{8}$ in. deep by $\frac{5}{8}$ in. broad are formed on the inside of the framing (as illustrated in the enlarged plan of the framing) to take the wall boarding, which can be of any of the many varieties now on the market, or of three-ply board.

The Boarding and Mouldings.—This boarding is nailed into the checks and a 2 in. by $\frac{5}{8}$ in. slip or moulding nailed to the framing to fill



Constructional Details and Dimensions of Ingle Nook

the checks and cover the joints between the boarding and the framing. These slips of mouldings are shown in position in the enlarged plan of the framing and also in Fig. E.

The mock beam over the front of the nook is formed of two 5 in. by 1¼ in bearers of wrought timber, tenoned into the corner posts and stiffened by means of distance pieces, 5 in. long by 1½ in. by 1½ in., spaced about 12 in. apart and securely nailed between the two bearers. To cover the space left between the two bearers a 3 in. by ½ in. plate is nailed to the under side of the former, the construction being fully shown in Fig. B. The 3 in. by ½ in. plate referred to is only fixed between the two supporting brackets, these latter being 3 in. thick by 16¾ in. long and 9 in. deep, the brackets being tenoned about 1½ in. into the corner posts. When in position the framework is wedged tightly up against the ceiling and a 1½ in. by 1½ in. cornice moulding run round the outside and inside of the frame at ceiling level.

A 2½ in. by 2½ in. cavetto moulding, forming a skirting, is nailed round the outside of the framework at floor level and returned round the corner posts to butt up against the shaped wings forming the ends of the seats.

The Wings and Seats.—These shaped wings are 1½ in. thick and are let about 1¼ in. into the corner posts and screwed to the floor. It is also necessary to cut raggles in them to take the backs and ends of the seats, the former being 1 in. thick and the latter 1¼ in. thick. A raggle should also be formed into which the ¾ in. sloping front of the seat can be housed.

The brackets supporting the seats are formed of 2 in. by 1½ in. stuff and are nailed to the sides of the posts and to the floor. There is a fall of 1 in. on the top member of the brackets towards the back in order to make the seat more comfortable.

The seat is 1¼ in. thick, moulded on edge and tenoned into the back, which, as already mentioned, is 1 in. thick screwed to the posts.

The seat front is ¾ in. thick and slopes inwards about 1½ in. It is screwed to the brackets and raggled into the shaped end pieces as already described.

A moulded and checked cope, out of 3 in. by 2 in. timber, is screwed to the framing, and this along with a small cavetto moulding nailed under the seat and along the front at floor level completes the formation of the seat. Fig. E gives full details as to how this part of the work should be carried out.

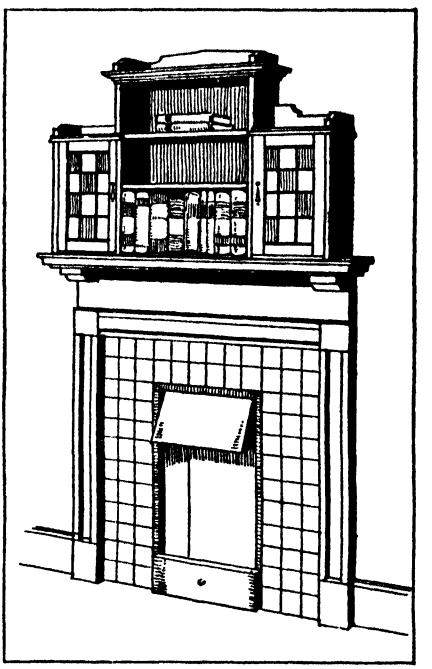
The timber employed for the work could either be of cypress or Oregon pine, which should be given one coat of stain and two coats of varnish, whilst the decoration of the panels can best be carried out by means of two coats of water paint, or oil paint finished flat.

One advantage of this erection is that it can be erected and demolished if necessary without much damage to the existing structure of the room.

OVERMANTEL, WITH USEFUL FITMENTS

Overmantels are generally more ornamental than useful, but in the type illustrated and described in this article will be found a handy fitment, and one which would enhance the appearance of any room.

Fitment.—The fitment consists of two small cupboards, between which are fitted shelves for holding books. The cupboards could be used for a variety of purposes, such as storing the small articles that generally lie about a mantelpiece, whilst one of the cupboards might be reserved as a sort of smoker's cabinet. The dimensions of the fitment will depend upon the length and breadth of the mantelshelf, so that the sizes given may have to be varied to suit the individual requirement. The fitment, being portable, is made separate from the mantelshelf, and on completion is simply screwed into position to the top of the latter.



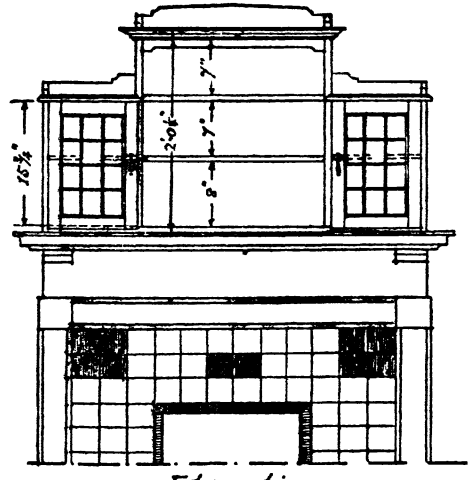
The Finished Overmantel.

Construction.—With regard to construction, the base is $\frac{3}{4}$ in. thick housed into the outer sides of the cupboards, as shown in Fig. A. It is also rabbeted along the front, at the cupboards, to form stops for the small doors, whilst there is also a check along the back to receive the back lining, which may be of three-ply boarding. The sides forming the cupboards are $\frac{3}{4}$ in. thick checked into the top, and the inner sides are raggled into the base as well as the top. Rabbets $\frac{3}{4}$ in. by $\frac{3}{8}$ in. deep are formed on the front edges of the sides to take the small doors (see Fig. H), the latter being formed of $1\frac{1}{2}$ in. by $\frac{3}{4}$ in. stiles and rails, with panels of leaded glass, which are fixed into position by means of $\frac{1}{2}$ in. by $\frac{1}{4}$ in. beads. Ordinary wood panels or mirrors can, however, be used in place of the leaded panels if desired. Small door stops $\frac{3}{4}$ in. by $\frac{3}{8}$ in. are fixed behind the doors, as shown in Fig. A, and the latter are hung on $1\frac{1}{2}$ in. brass hinges.

The sides are raggled for the shelves, which in the cupboards are $\frac{1}{2}$ in. thick, and for the bookshelves $\frac{3}{4}$ in. thick.

The tops of the cupboards are $\frac{3}{4}$ in. thick moulded on edges, and the top of the bookshelves is $1\frac{1}{4}$ in. thick moulded on edges. Sections of these tops are shown in Figs. A and G respectively.

The small shaped rails round the tops of the cupboards and bookshelves are $\frac{5}{8}$ in. thick checked into the tops. Fig. D represents the front elevation



Elevation



Plan

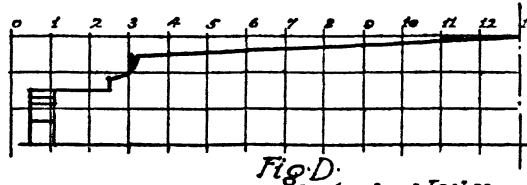


Fig. D.

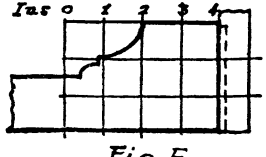


Fig. E.

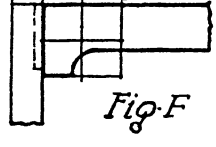


Fig. F

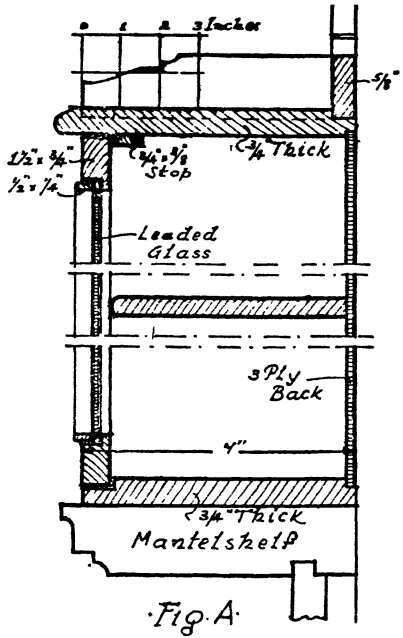


Fig. A.
Section through Cupboard

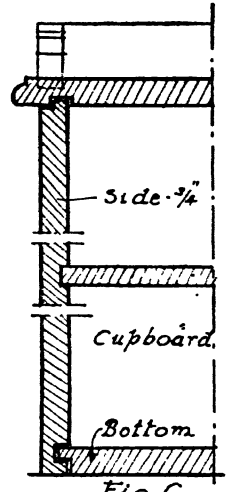
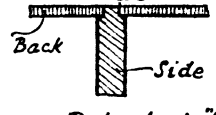


Fig. C.
Section through Side



Detail at A

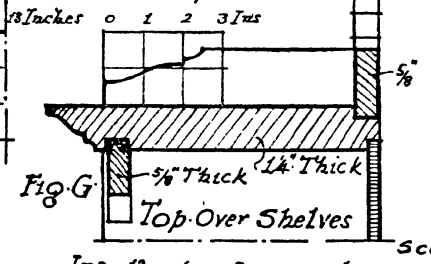


Fig. G
Top over Shelves

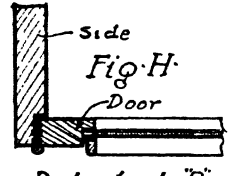
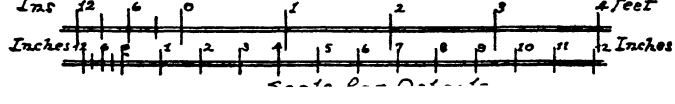


Fig. H.
Detail at B

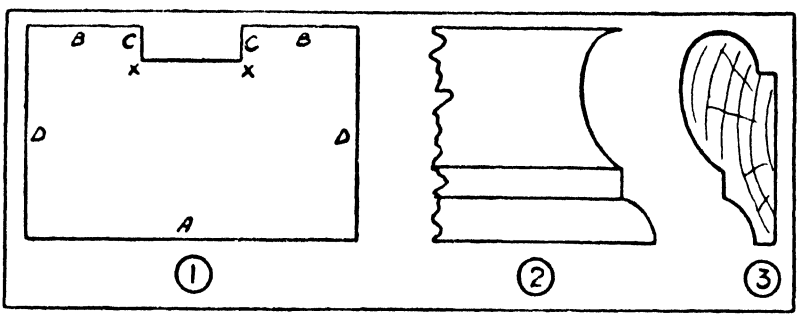


of the back rail over the bookshelves, the side rails being shown in Fig. G, whilst Fig. E illustrates part of the front elevation of the back rail over the cupboard tops, the side rails being shown in Fig. A. The small apron piece under the bookshelf top is $\frac{5}{8}$ in. thick, shaped as shown in Fig. E.

Suitable Woods.—If the mantelpiece is made of the more expensive timbers, then the fitment should be made to correspond, but if a cheaper job is desired, Oregon pine or cypress stained and varnished, or alternatively french polished, would prove suitable.

PICTURE RAIL, HOW TO FIX

For the handyman who is capable of using a few carpenter's tools, the following method of fixing a picture rail by scribing has much to commend it, for, although it needs a little more care and skill, it is



Showing Method of Fixing Picture Rail.

infinitely better than ordinary mitring by reason of the extra strength and neatness.

It is advisable to select a fairly plain moulding, as the plainer the moulding the easier the work. The moulding shown in (3) is a very good pattern to take as an example.

The position for the rail should be marked on the wall, taking care to keep the distance parallel to the ceiling. Commence by cutting a length of moulding for the longest wall of the room. In (1) this would be the side A; the ends of this piece should be left square and it should be long enough to just hang in position. Serve the opposite wall in exactly the same manner, and if this wall should be broken with a chimney-breast, as in (1), the recesses BB should be done in this manner. It will now be seen that the lengths of moulding for the shorter walls DD will need scribing to fit the moulding, and this can be very simply done by first cutting the ends to 45 degrees and either gouging or sawing round the resulting outline, leaving the end as shown in (2). If a reasonable amount of care is taken, this method makes a very neat job of the corners, and to ensure a tight joint it is best to leave the scribed lengths a trifle long so that they need just springing into position. It should be pointed out that the corners of the chimney-breast XX

will be mitred in the usual manner; the short pieces CC will then be scribed one end and mitred the other. If a successful job has been made of the corners, a few cut nails driven in at intervals is all that is necessary to complete the work.

REFRIGERATOR, USING ICE

Some points to be considered in refrigerator construction are :

That cold air sinks and warm air rises, so that ice should be at the top, in which position it causes air to circulate; that warm air leaves moisture as it condenses, and the alternate wetting and drying is bad for some materials; that the chest when closed should be as nearly air-tight as possible; and to keep the inside temperature low the body must be double, with insulating material between.

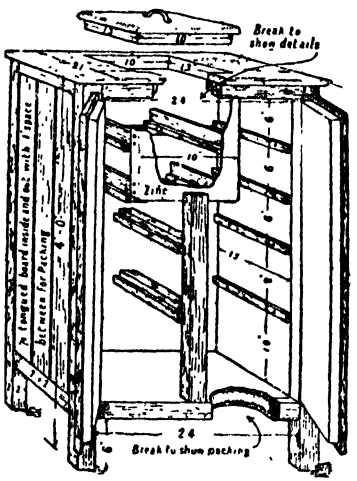


Fig. A.—An Ice-type Simple Refrigerator.

Insulating Material.—This should be a light porous material, which contains within itself minute cells or spaces for air. Cork is one of the best insulators. It is used in either natural or artificial slabs or in granulated form. Other good substances are slag wool, mill shavings from planing machines, sawdust, and charcoal. These must be sealed from air and damp, and this is done by the use of airtight and waterproof paper next to them on each side.

Design.—A design for a chest about the size required is illustrated in Fig. A. It should preferably be lined with zinc and all joints soldered. Sheet zinc can easily be cut, bent, and drilled for screw holes, but is not an easy metal to solder. For its attachment to the wood, gimp pins or ½ in. wire nails can easily be driven through if their positions are centre-punched first. In the illustration, ledges for the grids are supposed to be wood, screwed to the sides with brass screws, but galvanised iron or zinc would be more durable for ledges and grids, as for all the interior. Grids are often of wood, and, of course, simply rest on the ledges. The ice rests on a grid, and there must be a container for water beneath, sometimes provided with an exterior tap. In the illustration it is supposed that a loose container, such as an enamel dish or other suitable receptacle, will be put in from above and have a grid for the ice on top of it.

Ice Chamber.—The ice chamber is arranged by screwing a piece of zinc to the inside of the framework at the front, with flanged edges to which strips of wood are screwed to form ledges for grids. Support can be provided at the back by screwing horizontal strips to boarding. The ice chamber is purposely opened at the side to allow circulation of air.

The Frame.—The frame of the refrigerator has tenoned joints at the base and dovetailed ones at the top, and where possible it has ¼ in. grooves to receive tongues on the boarding of the panels, which are flush with the frame both outside and inside. Alternatively, by having frame members of larger section only the inner boarding need be flush with them. As the chest is moderately large, two doors are shown, only one of which needs to be opened at a time. A common design for a small chest is to have the ice at one side instead of central, often with the full depth of chest occupied with ice and water container, so that a single door of reduced width is used. In very small ones there are no doors, but a loose or hinged cover, and grids have to be lifted out from above. The cold air thus does not easily escape.

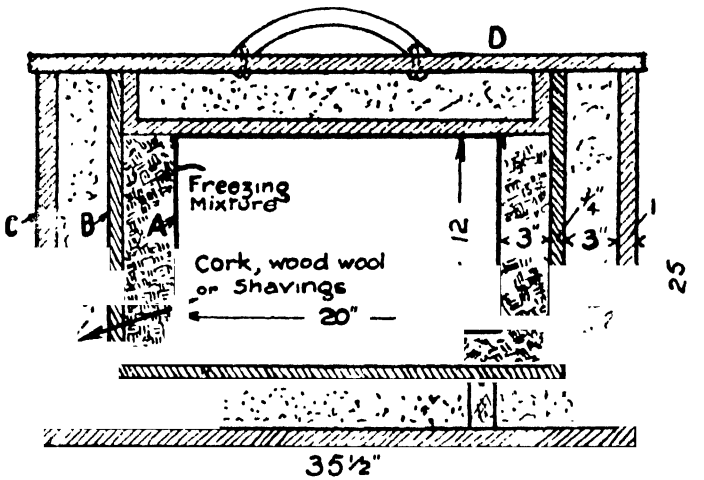


Fig. B.—Another Easily Made Home Refrigerator.

Simple Box-type Refrigerator.—A simple box-type refrigerator that can readily be made by the handyman is shown in Fig. B. It consists of an inner zinc box A, measuring 12 in. by 12 in. by 20 in., surrounded by an outer wooden box B, with a 3 in. space between the two boxes, filled with freezing mixture or broken ice. Between the outer wooden box C and B is a 3 in. space filled with cork, wood wool, or shavings. A drain plug can be fitted to the container B, if desired.

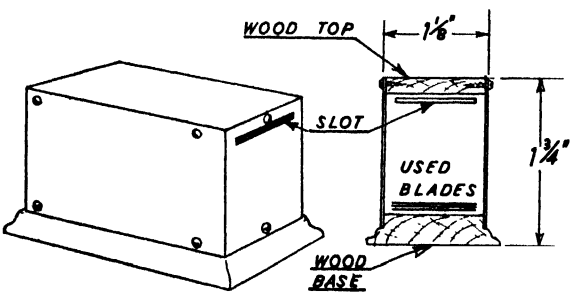


Fig. A. Fig. B.

A Receptacle for Used Razor Blades.

SAFETY-RAZOR BLADE RECEPTACLE

A neat receptacle for solving the problem of what to do with used safety-razor blades is illustrated in Fig. A and Fig. B. It consists of a box a little larger in its internal dimensions than the blades to be deposited. The box can conveniently be made of sheet tin for the four vertical sides and wood for the top and bottom. On the side of the box,

at one end, a slot is cut with a chisel. This is opened out and filed with a thin ward file so as to allow a blade to pass through readily.

The base can be made from a piece of oak or beech and the top cover of the same wood, about $\frac{1}{8}$ in. thick. Very small brass woodscrews are used to hold the cover and base to the metal sides. Suitable internal dimensions for a container to hold about 2 years' supply of used safety razor blades of the Gillette pattern would be as follows :—Length, $2\frac{1}{8}$ in.; Width, $1\frac{1}{8}$ in.; Height, $1\frac{1}{2}$ in. The advantage of this receptacle is that it is quite safe from the viewpoint of children, but the blades can be removed when required by undoing the small screws. A single blade can be taken out by reversing the container and manœvring the blade through the slot.

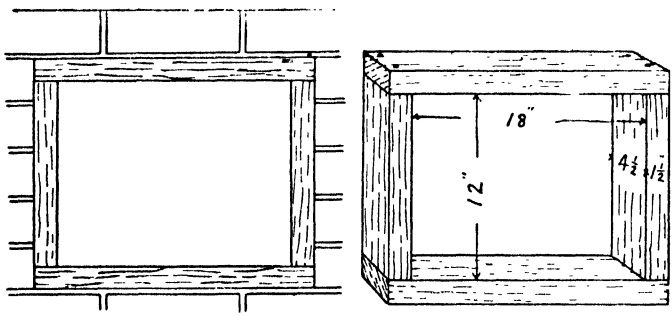


Fig. A Opening in brickwork fitted with wood lining

Fig B. Frame with suggested size for opening.

Details of Serving Hatch.

When full, the blades are taken out and, preferably, buried in a hole about 2 ft. or so deep, when they will soon rust away.

SERVING-HATCH

The following should interest any amateur who wishes to construct a serving-hatch such as is usually arranged between the kitchen and dining-room.

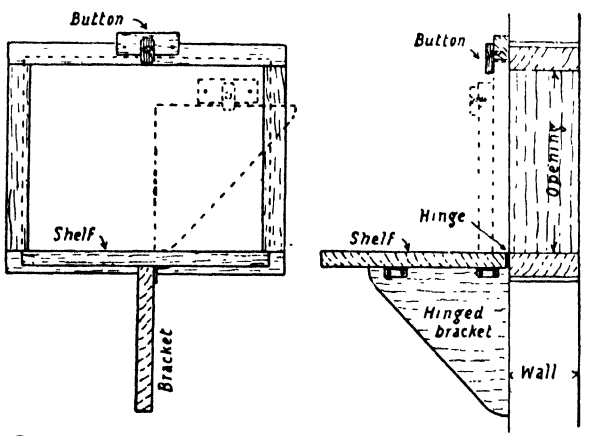


Fig. C. Front and side views of hatch. Dotted lines show it closed.

Some Further Details of the Serving-hatch.

A wood frame in the opening, Figs. A and B, would be necessary, and it is probable that this would give sufficient support to the bricks above. If there is a room above its floor joists should be considered in relation to the opening. They can be disregarded if they rest on a wall plate bridging the opening, or if their ends rest on the wall to one side of it. The brickwork can be relied on if there is little weight above, but a wood lining would be fitted in any case. The opening will be made by chipping with cold chisel and hammer. The lining will be secured by driving a few stout nails

through it into the mortar joints or into plugged holes. The flap on the dining-room side will be hinged to the sill of the frame as in Fig. C, and when down may be supported by a bracket as shown. If the bracket is hinged as shown it will fold to one side against the under surface of the flap when the latter is up and can be kept there by a button. Alternatively two fixed brackets of less depth might be screwed to the under surface and would probably not be in the way when the flap is up. The flap itself may also be held up by a similar button, as indicated in the views Fig. C. A convenient height for the hatch in question is 4 ft. from the floor.

SHELF FITTING

When a number of shelves are required one above another the best and safest way is to use wood uprights at the ends extending from the

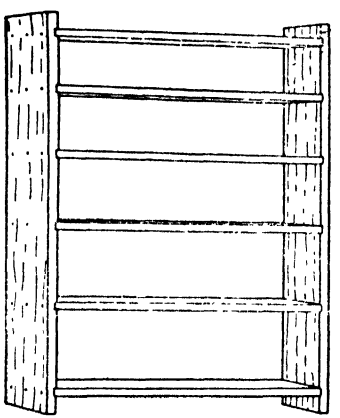


Fig A. Shelves with end supports for resting on Floor.

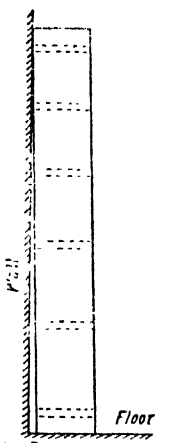


Fig. B. Shelves leaning back at top.

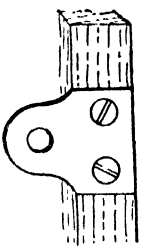


Fig C. Wall plate screwed to a back edge

floor to the top shelf, the ends of the shelves fitting into grooves or rabbets in the uprights and secured with a few wire nails (see Fig. A).

Instead of cutting grooves, ledges for the shelves to rest on may be screwed or nailed to the inner faces of the uprights. This is not so good a way as grooving the sides, because the ledges are sometimes in the way and do not look as neat as grooves.

Nailing or screwing the shelves between plain sides with no support except that of the nails or screws is unsuitable, because downward pressure on a shelf may result in its splitting out at the places where the nails are.

Fixing Self-contained Shelves.—Shelves put together as in Fig. A do not necessarily have to be fastened to the wall at all, but to prevent risk of falling forward they should lean back slightly, as in Fig. B, the lower ends of the uprights being cut slightly out of square to allow for this. If this does not seem sufficient for safety, a precaution is to use wall plates, Fig. C. One of these is screwed to the back edge of each

upright near the top and, when the shelves are in place, a screw is put through the extending part of the wall plate into a plug in the wall. These plates are used also for the entire support of very light sets of shelves which do not rest on the floor; not less than four plates being used in such cases.

Recess and Bracket Shelves.—When a single shelf has to be fitted to a wall there are two ordinary methods of supporting it. Nearly always one end can start from a corner of the room, and then a simple way of supporting that end is to nail a ledge or block of wood to the end wall for it to rest on. Often shelves can extend the length of a recess in the wall, or perhaps the full length of the room, and in these cases both ends can rest on ledges, as in Fig. D.

The other way is to use brackets as in Fig. E. In the case of long shelves these may be necessary in addition to the ledges at the ends; or one end may rest on a ledge and one or more brackets be used for the other part of the shelf. Metal brackets are best and they must be screwed to plugs in the wall or to wood framework or board.

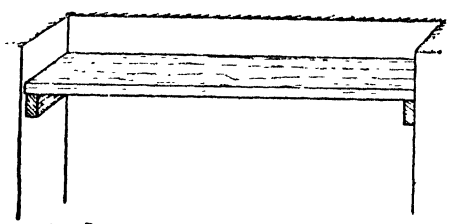


Fig. D. Shelf resting on ledges nailed to wall

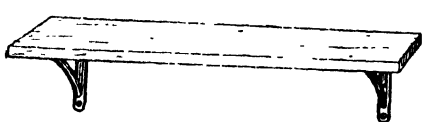


Fig. E. Shelf on brackets screwed to wall

Plugging Walls for Screws.—The attachment of brackets or ledges to the wall must be as secure as possible, but shelves do not necessarily have to be fastened to them. One or two screws are often desirable, but in some cases it is sufficient to place the shelves loose on their supports. They should not be nailed, as the use of a hammer is likely to loosen the attachment to the wall.

Brick or stone walls have to be plugged for screws, but it is quite practicable to nail wood to a brick wall without plugging. A single nail will hold better in a plug, but when a number of nails can be used to attach a piece of wood to a wall it can be made secure enough with stout wire nails, which will enter mortar joints or brick itself. Holes for plugs can be bored with a brace and a flat drill, but an easier way, especially in awkward places, is to use a hammer and plugging chisel. The latter is made in more than one form. The essential is a good cutting end with plenty of clearance behind for the waste brick to escape. One form is steel tube with serrated end; another star-shape in cross-section; another a plain narrow chisel tapering smaller towards its steel handle; another in the form of a flat drill with steel handle for using a hammer on. In using any of these the tool is turned during the hammering and drawn back frequently to clear the waste brick from the hole. A depth of 2 in. to 3 in. is enough for a plug, but on papered wall the bricks may be covered with nearly an inch of plaster which easily crumbles away and must not be relied on, the secure

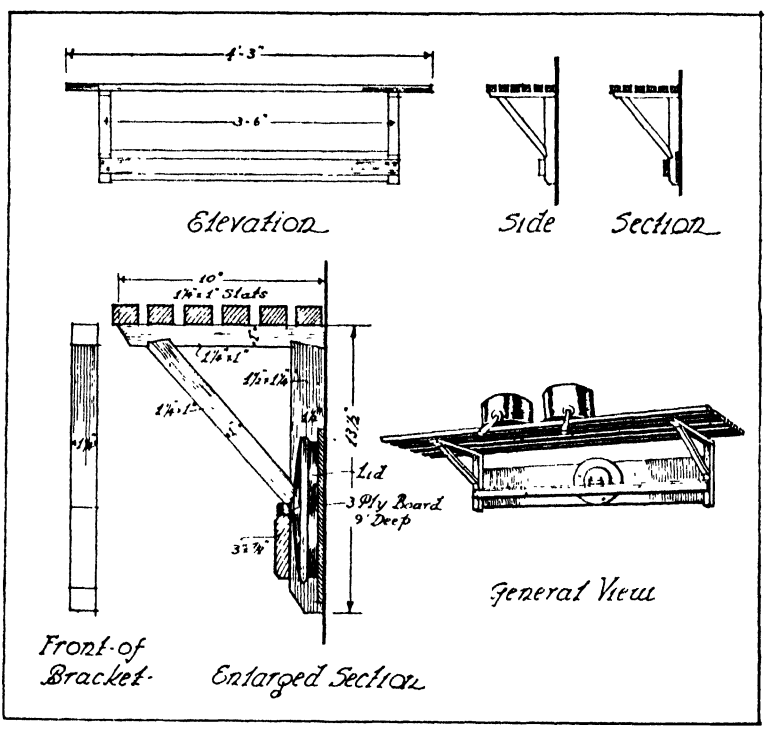
hold of the plug not commencing until it enters the brick. About ½ in. diameter is generally big enough for a wood plug.

Lath and plaster walls, which are sometimes used as partitions, are the most difficult to deal with, and unless solid wood can be found in them it is best not to attach brackets. Partition walls covered with plywood or other thin material do not afford a satisfactory hold for screws or nails except in the framework which the covering is nailed to.

Shelf boards are generally from ¾ in. to 1 in. thick and can seldom exceed 3 ft. in length without intermediate support.

SHELF FOR KITCHEN UTENSILS

The accompanying drawing shows a simple fitment for keeping pots and lids, the arrangement for storing the pots consisting of a number



A Useful Shelf for Kitchen Utensils.

of battens or slats 1¼ in. wide by 1 in. thick nailed to framed brackets which are made to the dimensions given and hooked or screwed to the wall. The shelf, being constructed of slats, is much more hygienic than the ordinary solid shelf, as it allows the air to circulate inside the pots, keeping them fresh and sweet.

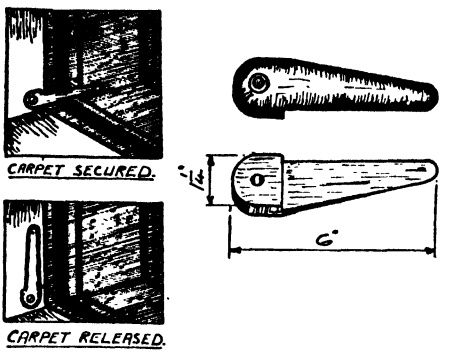
The lid holder is formed by screwing a 3 in. by ⅞ in. piece, bevelled on the edges, to the front of the legs of the brackets, and, to prevent

the wall behind the lids from becoming dirty, a piece of three-ply is nailed between the legs of the brackets as illustrated in the enlarged section.

The timber used is white pine, and the woodwork could be painted three coats oil paint. The top surfaces of the slats, however, should be left the natural wood so that they can be scrubbed when necessary.

STAIR-CARPET HOLDER

The stair-carpet holder shown in sketch is neat and effective in use. They can readily be made in the home workshop. Similar designs can be obtained, only made of metal. This one is a piece of shaped wood, oak or any hard variety. It is cut away on the back side to accommodate the thickness of the carpet, being shaped off at the front to remove as much obstruction as possible when using the stairway. Dimensions are shown for length and width. If made ¾ in. thick at screw end and tapered off to a ⅝ in. diameter nose, it looks quite neat if polished or enamelled to choice. Use a No. 10 brass screw for securing holder. Sketch shows holder in position and the lower one shows the holder hinged back for sweeping carpet, thus leaving the carpet quite exposed for this operation. If the holder gently grips the carpet in the secured position, it will be found that the carpet is held sufficiently at its two edges for all ordinary service, as well as looking modern.



A Simple Stair-carpet Holder.

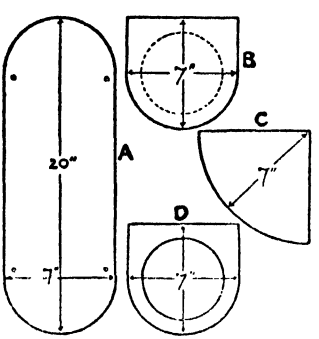


Fig. A.

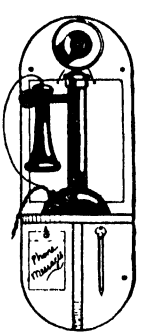


Fig. B.

Useful Telephone Bracket.

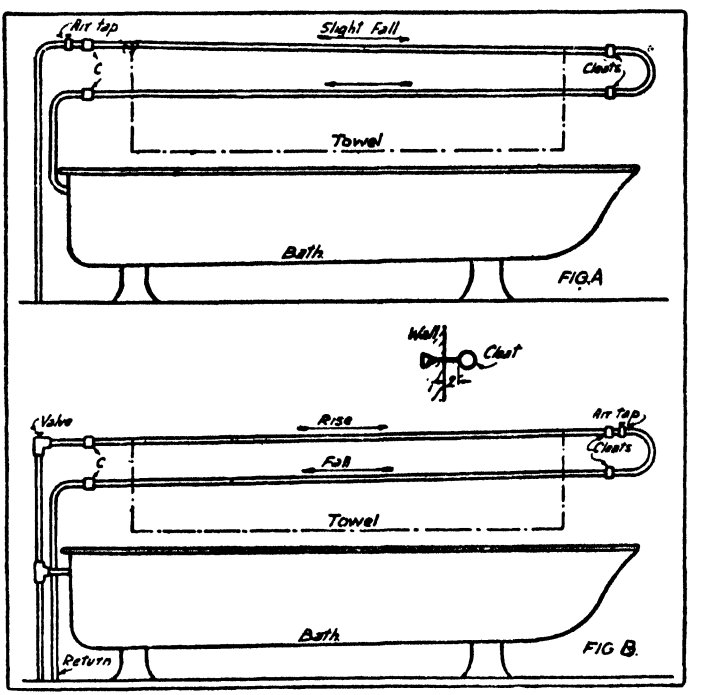
TELEPHONE WALL BRACKET

An easily made wall bracket for a telephone is shown in the accompanying diagrams. It consists of four pieces of wood cut to the shapes indicated in Fig. A, the parts marked A and C being ½ in. thick, and those marked B and D ¼ in. in thickness. The size of the circular hole in the overlay marked D, which is to be glued to the shelf B to form a recess or well for the bottom of the telephone, must of course be governed by the diameter of the base of the particular instrument for which it is intended. Having cut out the several parts, they should be assembled with the aid of glue and small screws so as to form a strong and

rigid bracket, as shown in Fig. B. The shelf for the telephone is mounted at right angles to the backboard A, and is strengthened by the support C.

To enhance the appearance of the completed bracket, it can be stained and polished to harmonise with the furniture of the room in which it is to be fitted; and the circular recess in the shelf may be lined with a disk of green baize or felt. The bracket should be fastened securely to the wall at a convenient height by means of four nails driven through the holes in the backboard A. As shown in Fig. B, a card on which is written a list of the telephone numbers of one's friends, local tradesmen, etc., can be hung behind the telephone on a small hook screwed into the top of the backboard, while a tear-off pad for messages and a pencil can be kept on hooks below the shelf, so as to be handy when recording messages, etc.

The later pattern telephone receiver unit can also be mounted on a similar type of wooden bracket, only an alteration in the dimensions shown in Fig. A being necessary for this purpose.



Making Hot Towel Rail for the Bathroom.

TOWEL RAIL (HOT-WATER HEATED)

A hot-water heated towel rail suitable for a bathroom can be made as shown in the illustration (Figs. A and B).

Obtain a 12½ ft. length of No 19. gauge 1 in. copper tube bent to shape of a ⊃ and fix to bathroom wall by means of four wall cleats 5 ft. 6 in. between (as sketch). The cleats may be of galvanised iron or brass; brass has the preference for appearance, though a little dearer.

(Fig. A).—Connections are: disconnect hot-water tap union and connect to top pipe of rail; connect bottom pipe of rail to hot-water tap; fix air tap at the highest point of rail (as sketch). The hot water drawn for the bath supplies the heat for the rail. No valve needed.

(Fig. B).—Make branch connection to hot-water pipe and top pipe of

rail through valve, and connect bottom pipe of rail to return pipe of hot-water system. This rail will always be hot when valve is open. Particulars of valves, pipes, Ts, and elbows cannot be recommended unless further details are known.

VERDIGRIS REMOVAL

Verdigris on brass or copper may be removed by an application of paraffin and powdered pumice or bathbrick.

An alternative method is to first wash with strong soda and water, then rub with vinegar and salt or with oxalic acid. Wash immediately after the rubbing and polish with tripoli and sweet oil. Unless the acid is washed off the article will tarnish quickly. The oil polishing will give a deep yellow lustre, which should last for several months.

VERMIN, TO GET RID OF

It might be thought that vermin would only be found in small cottages where the occupiers were dirty in their habits. Such, however, is not the case. Even in very large, well-kept residences the pests will sometimes be found in distressing numbers, and however disagreeable the task of getting rid of them may be, it must be dealt with.

Various liquids of a poisonous character may be applied to a wall infested with bugs, but the essential is to strip the wall-paper, to apply corrosive sublimate, and—this is most important—to use a painter's torch over all crevices, corners, or holes where it is likely that the horrible insects may lurk. In most towns the Sanitary Authorities will undertake this work for a fee. They will not, however, touch the other pest—fleas. During the war when this difficulty had frequently to be dealt with it was found that a liberal use of crude creosote was in every way most effectual. A room infested with fleas can be rendered sweet and clean by painting the whole of the floor with creosote, taking care that plenty of it gets into the open joints of the floorboards, the space beneath the skirting board—in fact, in all interstices. If this is done the trouble will be over, excepting that the floor cannot be painted or varnished.

Removed from Walls.—Prevention is better than cure, as regards the evil of vermin, such as bed bugs, ants, etc., on papered walls. This can be done by adding a little colocynth powder (about 1 part in 50) to the paste used for hanging the paper.

If, however, breeding is suspected on certain parts of the wall where the paper has become loose or defective there are many recipes which might be tried, of which the cheapest and most efficient is benzene mixed with a little oil of mirbane. This mixture dries quickly and leaves no stain, but must be used with care owing to the inflammability of the vapour.

Where the walls and woodwork of a room become invaded with these pests, the safest and surest method of killing is by burning sulphur. Windows and doors should be carefully sealed up, and a rubber tubing

passed through a keyhole or some such outlet, to which bellows should be attached on the outside. With the aid of these, a complete circulation of the fumes inside the room is ensured.

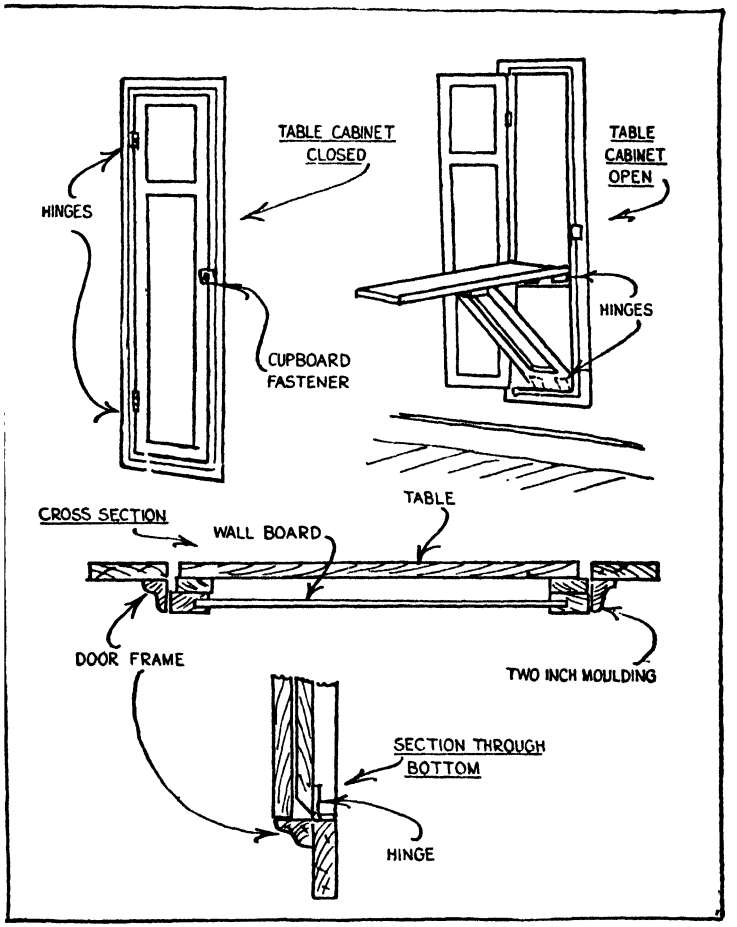
WALL CABINET FOR HOLDING A COMBINATION TABLE

The construction of a table made to fold and stow in a wall cabinet, as shown in the attached sketch, is a practical and simple means for making up a concealed fixture that is useful and at the same time does not infringe on floor space.

The drawing follows the method that was used by one handy homeowner to provide a combined ironing-board and sewing-table in the kitchen of his small home.

The cabinet frame was made up from 1 in. by 3 in. pine. The door was constructed of 1 in. by 3 in. pine, with wall-board panels; 2 in. moulding was placed on the frame around the door.

The table was made from a single piece of white pine, hinged to the cross support. The brace was made up from 1 in. by 3 in. pine and hinged at the bottom of the frame.



Wall Cabinet for Holding Combination Table.

Two small brass hinges and a cupboard catch were used to support and hold the door closed.

The cabinet was white enamelled, while the panels were made to harmonise with the tan-coated kitchen walls.

This same type of cabinet is equally useful for working up as a drawing-table, typewriter table, reading and a variety of other purposes.

WALLS, HOW TO BORE HOLES INTO OR THROUGH

Many amateurs will go to quite a lot of trouble when wiring a room or garage and run their wires over long distances to avoid taking them through a wall. Not only is this a bad practice from the point of view of increased electrical resistance, which means wasted electric energy, but it is expensive, for a much greater length of cable is required and more fastenings; further, it takes a much longer time as a rule. The only reason that most people will go to the extra expense and trouble is that they are afraid to tackle the job of driving a hole through a thick wall.

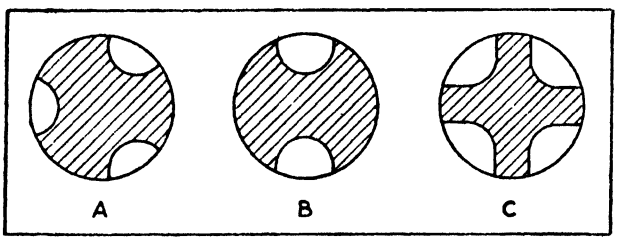


Fig. A.—Sections of Suitable Wall Drills.

Wall-boring Tools.—There are several wall-boring tools now on the market, which will bore holes through 12 in. to 18 in. brick or concrete walls, if necessary. These tools resemble parallel fluted drills, except that they generally have conical points instead of cutting edges. Fig. A shows three typical wall-boring sections. Sketch A is a three-fluted section similar to that of the Rawlplug wall tool, which can be obtained in various lengths. The fluted portion is to allow the material loosened by the point to escape from the hole. The



Fig. B.—Typical Wall-boring Tool with Hollow Portion and Side Slot.

tool is generally provided with a solid stem for holding; this is also more convenient for hammering. Sketches B and C illustrate two- and four-fluted wall drills, which serve the same purpose.

The Boring Operation.—The operation of boring a hole through a brick wall, say, with one of these tools is to employ a suitable size of engineer's hammer, not too heavy nor too light. In the former case the arms will weaken too quickly, and one may either miss-hit the drill or hit it obliquely; in the latter case the blows will be too light and the work will be prolonged unduly.

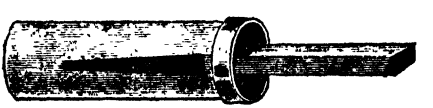


Fig. C.—Showing Method of Inserting Plug, with Wedge, in Hole Bored in Wall.

The wall drill is held perpendicular to the wall and hit sharply and rapidly whilst it is rotated. It need only be turned a little at a time in opposite directions by flexing the wrist, but it is important not to keep it stationary whilst hitting, or it will jam in the hole. It should be removed occasionally, to clear the hole and to examine progress.

The improved-wall boring twist drill and the hand-operated mechanical or the electrical percussion hammer for use with wall drills, previously mentioned, enable holes to be made more conveniently and with greater speed than the method here described.

The time required to bore a hole depends upon the nature of the wall, its thickness and the size of the hole required. As a rough guide it may be mentioned that it is possible to bore a $\frac{3}{8}$ in. hole through a 9 in. brick wall in ten to fifteen minutes, using a suitable wall drill for the purpose.

To make sure of the size of the hole, a trial hole should be made in a piece of scrap material.

(See also " Wall Plugs and Wall Fixtures.")

WARDROBE, BUILT-IN

Modern tendencies in internal decoration and house planning generally are towards simplicity, coupled with efficient service, the elimination of the non-essential, and the lightening of labour in maintenance.

Advantages of Plywood.—Plywood in its modern forms is a definite aid in the realisation of these ideals, and has the advantage of relative cheapness, durability, and dependability. Unlike other materials, plywood is obtainable in large sheets and with a wide choice of thicknesses; it can be had with a veneered face, and then presents all the attractive appearance of the highest-priced timbers.

These merits are particularly apparent when built-in fitments are incorporated into a new building, or have to be adapted to an existing structure. Take, for example, a built-in wardrobe suitable for the average small house, costing in the neighbourhood of £3,000. The wardrobe can be made at comparatively low cost with the aid of plywood, is a convenience to the owner, and adds considerably to the value of the property. There are various ways in which the work can be successfully approached—one method is here illustrated, and has the advantages of adaptability to varying conditions. The design shown in Fig. A is simple, elegant, and efficient; it provides two good deep hanging cupboards, two useful drawers, and a central feature in the form of a recess. This recess has a mirror on the wall at the back, and a flush-fitted electric light in the ceiling above, and is thus admirable as a dressing-table. The space below the drawers forms a large boot cupboard, and thus the wardrobe serves all the essential needs of a bedroom fitment.

Proportions and sizes will have to be modified to meet existing conditions, but as far as possible it will be found advantageous to make the doors of the order of 6 ft. in height, 27 in. in width, and to allow a depth of 21 in. or as much as is practicable. The most harmonious results are attained when the central division is equal in width to the doors.

Construction.—The general principles of construction are first to erect a suitable light framework of ordinary deal, and clothe it with plywood sheets, making the doors from a single sheet of sufficiently thick plywood, or by covering each side of a light framing.

It is possible to obtain a selection of ready-prepared plywood doors ready for fitting to the frames, and when this course is adopted it is essential to adapt the dimensions of the main frames to correspond. One

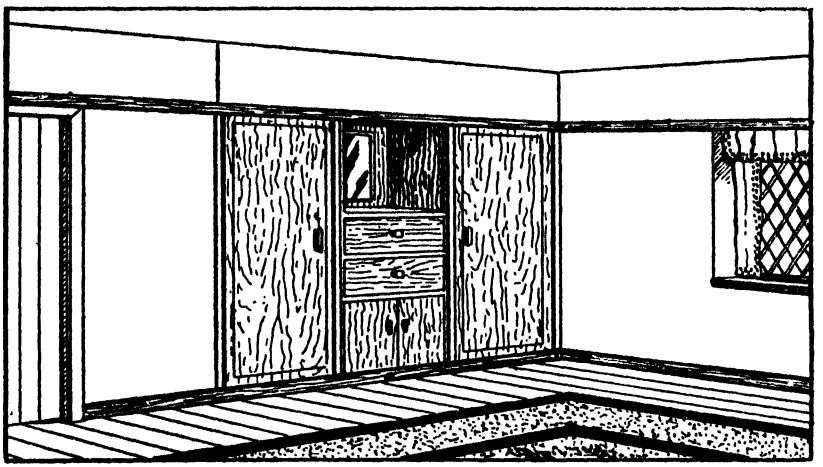


Fig. A.—The Finished Wardrobe.

of the difficulties in adapting plywood to furniture of this nature is to treat the corners satisfactorily, so as to cover the edges of the plywood sheets. One effective method is shown in semi-sectional form in Fig. B, and comprises a rabbet worked in the outer edge of the main frame, and the subsequent filling of this rabbet with a triangular-sectioned fillet or slip. This slip should be $\frac{5}{8}$ in. across the flats, and the rabbet should then be $\frac{7}{16}$ in., measured on each face. Thus when the slip is fitted to the rabbet, the outer edges will project $\frac{3}{16}$ in., and so cover the exposed edges of the plywood sheets, which are simply glued and pinned to the main faces of the framing. This system has manifest practical advantages: first, the timber can be prepared in advance in the workshops, and the slips prepared in convenient lengths; secondly, the plywood sheets can be worked to approximately correct dimensions, and after they have been permanently fitted, the edges are quickly cleaned to a perfect surface by running a rabbet plane down the rabbet itself. The revealed joints are thus well fitting and workmanlike, while the slips themselves can be stained to match, or preferably be coloured to contrast, and usually look well when dull ebony-black in appearance.

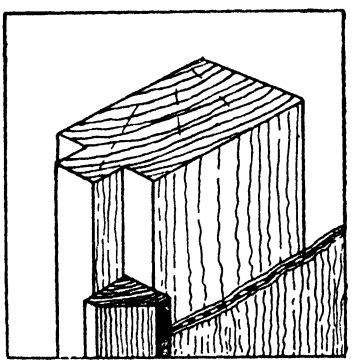


Fig. B.—Finishing Edges of the Plywood Panels.

Main Framing.—The disposition of the main framing is shown in Fig. C, and the whole of the main portions can be in scantlings of 2 in.

by 1½ in.; most of the joints are perfectly satisfactory if butted and nailed, as the plywood sheets when added bind the whole together in a most efficient manner.

It is desirable to build up a raised floor covered with plywood, somewhat as indicated in the diagram, and when the wardrobe is fitted to a recess it is as well to carry the line of the picture rail across the face of the structure, as is done in Figs. A and C.

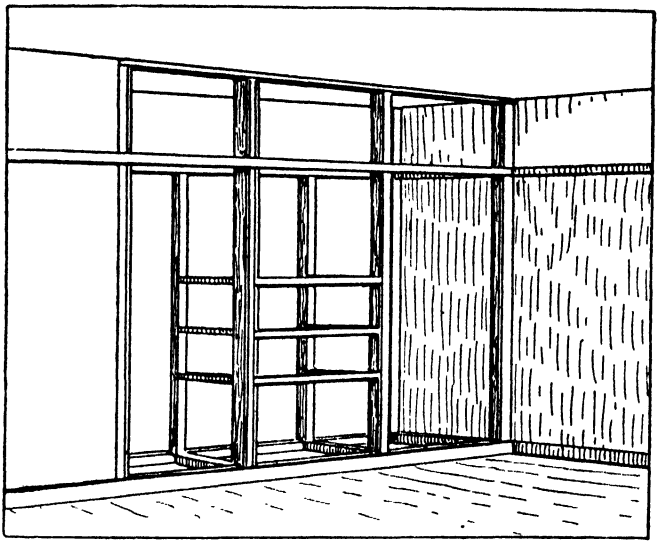


Fig. C.—The Framework in Position.

The studs which fit against the walls are rabbeted on one edge only, but the middle studs are rabbeted on both edges, as are the rails for the drawers. The space above the picture rail is preferably filled in with plywood and whitened, or may be utilised as cupboard space if necessary. The various wall surfaces are then covered with the plywood and the slips fitted, mitring them at all angles as indicated in Fig. D, which shows constructional details of the middle section of the wardrobe.

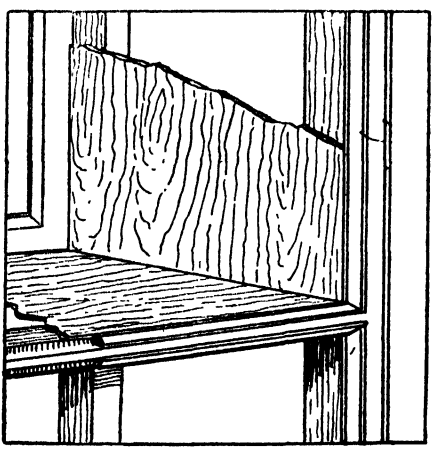


Fig D.—Constructional Details of the Recess.

Doors and Drawers.—The doors and drawers are made and fitted in the customary manner, the mirror fixed, and a hinged frame with an opal or ground-glass panel fitted in the ceiling to accommodate an electric light, the leads for which should be run in proper steel conduit after the frames are erected, but prior to covering with the plywood.

Finish may be by staining and polishing, or by paintwork, according to taste or the requirements of the owner, and any desired interior fittings added as requisite.

WINDOW SEAT

The attractive window seat shown at Fig. A can be made from two deal boxes, some easily procured planed wood, a few pieces of plywood

and some lengths of ball beading, which is stocked by most cabinet-makers. The method of transforming the deal boxes into a presentable piece of cabinet work is illustrated at Figs. B and C; it can be done with little skill and the ordinary tools to be found in most houses.

Preparing the Pedestals.—First fit a shelf inside the boxes; the wood can be obtained from another box, or cut from some $\frac{1}{4}$ in. thick planed board. The next step is to cut off pieces of thin plywood to the same size as the sides of the boxes; four of these pieces should be prepared.

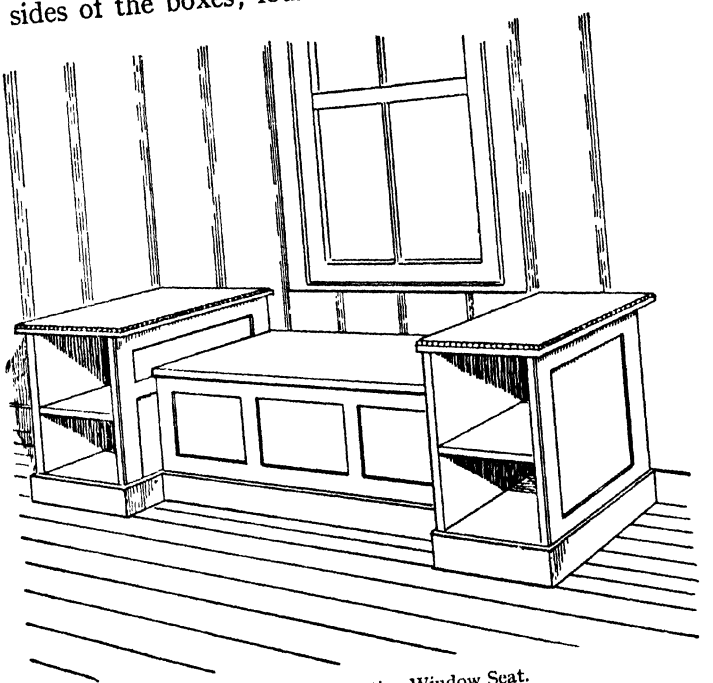


Fig. A.—An Attractive Window Seat.

Now provide some planed batten, 2 in. by $\frac{1}{2}$ in., and cut off two lengths for each side to the exact height of the boxes; place them on the sides, measure the space between and then cut off two lengths to the measurement for each frame. The ends of the inner pieces should be sawn off quite true and square, and then they are fastened together with corrugated steel fasteners as shown in the separate detail at Fig. B. On the two inside frames fit another inner piece as shown. the height being 12 in. to 15 in., depending on the height of the boxes. The frames are now nailed to the sides of the boxes, using oval brads so that the heads can be punched below the surface without leaving an unsightly mark. Another method of attaching the frames is to screw them on from the inside of the box. The boxes are fitted with a plinth; this, shown separately in Fig. B, is made from 4 in. by $\frac{3}{4}$ in. wood, but before the plinth is fitted the front edges of the two boxes are covered with strips of $\frac{1}{4}$ in. wood; planed laths

can be obtained just about the size. Small brads should be used to attach the strips, which should be fitted as neatly as possible. The front board of the plinth, cut at a mitre angle at each end, is now nailed on with the top edge flush with the bottom of the box at the inside level. The side lengths are now carefully fitted at the corners and nailed on securely. The tops of the boxes are made as shown at Fig. C. First a frame is made of 2 in. by ½ in. wood, so as to protect each side and in front at least ½ in., the corners being secured with fasteners as shown, and then nailed to the box top. A piece of plywood is now cut out to measure ¼ in. smaller all round. This is bradded on to the frame, and then the rabbet so formed is filled in with ball beading, this being glued and bradded at intervals.

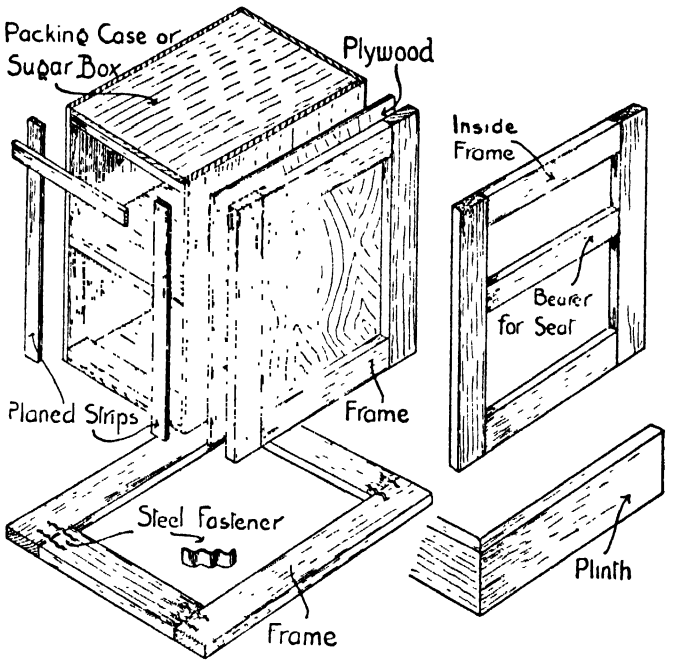


Fig. B.—Constructional Details of the Side Members of Window Seat.

The Centre Portion.—The two pedestals are now placed at the desired distance apart, a frame is made from 2 in. by 1 in. wood to fit in between, with two or three intervening bearers, and the whole secured with the corrugated fasteners. The top is covered with plywood, with or without a rabbet filled with ball beading, and then the seat is nailed to the two end bearers. Instead of the framed seat, a suitable length of 11 in. by 1 in. board can be used. The lower portions of the boxes or pedestals are jointed by 4 in. by ¾ in. wood as used for the plinths; this will give a neat finish to the base. The front is formed by a frame made of 2 in. by ½ in. wood, joined up with fasteners to form three panels, the whole of the back of the frame being covered with plywood. The covered frame will form a flap which can be hinged to the plinth, but the latter should be strengthened by nailing it to small blocks fixed to the floor inside at the back. A

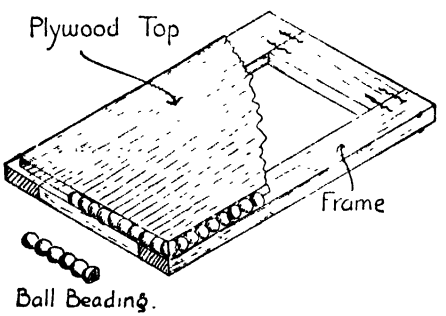


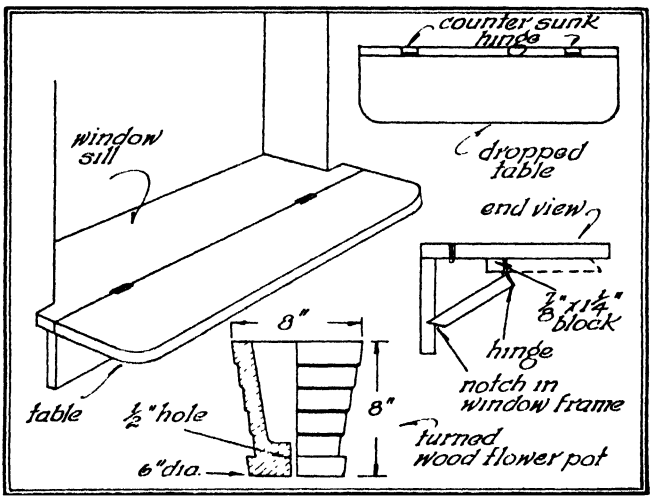
Fig. C.—Details of Tops of Boxes.

strip of wood should also be bradded to the under side of the seat to prevent the flap from going back too far; it will also be necessary to fix a cupboard catch or a ball catch to hold the flap in position.

The finished work should be coated with an oil stain to match the furniture in the room, and when the stain is dry it can be rubbed over with a wax polish.

WINDOW-LEDGE FLOWER-POT SET

This shop-made set consists of a folding table which is attached to the inside window sill, and from four to six lathe-turned flower pots in oak or beech. If the edge of the sill is rounded, plane it square and attach the table as shown so that the ends are flush with the ledge ends. The table should be about 9 in. wide, and the corners rounded. One can use also fir or pinewood, staining and finishing to match the woodwork. The two hinges are countersunk, while the underside of the table has a hinged, folding brace. The block, $1\frac{1}{4}$ in. square and $\frac{7}{8}$ in. thick, is attached to the under side with screws, and the brace board, $1\frac{1}{4}$ in. wide and about $6\frac{1}{2}$ in. long, is attached to the block with a stout cabinet hinge. A notch is cut in the base of the window frame to take the bevelled end of the brace.



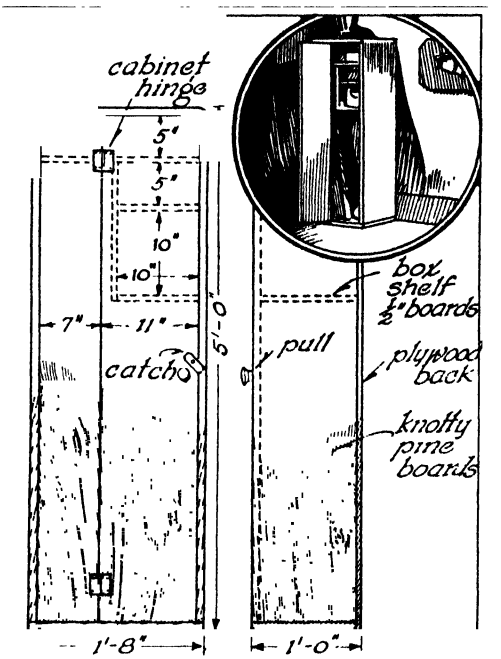
Window-ledge Flower-pot Set.

Modern, lathe-turned wood flower pots will prove attractive. These are turned down from wooden blocks 8 in. square as shown, with a base about 6 in. in diameter. Turn out the centre of the pot, leaving walls $\frac{3}{4}$ in. thick and a block at the bottom about 2 in. thick. Bore a $\frac{1}{2}$ in. hole through the centre of the block so that the soil may absorb moisture from a brown pottery bowl or dish in which the pot is placed. Sand the pots and give them two coats, inside and out, of clear lacquer to prevent the wood from absorbing too much moisture.

WOODEN LOCKER FOR SPORTSMAN'S USE

A locker for the hall or den, in which to keep one's guns, fishing and hunting jackets, boots and other equipment stowed away snugly, is a useful asset. Make the sides, top and bottom from one-by-twelve pine boards. The locker measures 5 ft. high, 1 ft. deep, and 1 ft. 8 in. wide.

Saw out the boards and finish them with plane and sand-paper. Cover the back with a single piece of plywood, or two thin boards nailed in place. Saw out a shelf and partitions from ½ in. pine material, nailing the shelf at the top and to the bottom of this shelf fastening a vertical and two horizontal pieces with screws, to form a box shelf about 10 in. square at the bottom and a shelf 5 or 6 in. deep at the top. Fasten the ends of the shelves to the side of the locker with nails or flat-head screws. The shelf arrangement may be altered to meet one's needs, but one should leave plenty of height under the top shelf at one side of the box shelves, so that one can stand guns or rod cases upright. Set the front edges of the shelves in from the front, so that one can nail a pine board 7 in. wide to the left side, flush with the front edge of the locker. Plane down a board to fit the remaining space at the front, and fasten it to the narrow board with stout cabinet hinges, and add a wooden knob at the edge of the door panel for a knob. The door can be secured with a wooden catch, as shown. Round the upper edges of the locker with a rasp, and sand or steel wool the outside of the locker, giving it a natural varnish coat, or staining it a dark walnut brown, topped with a clear lacquer or varnish coat. Add two or three hooks on the inside for jackets or waders.



A Locker for the Sportsman's Use.

SECTION 5

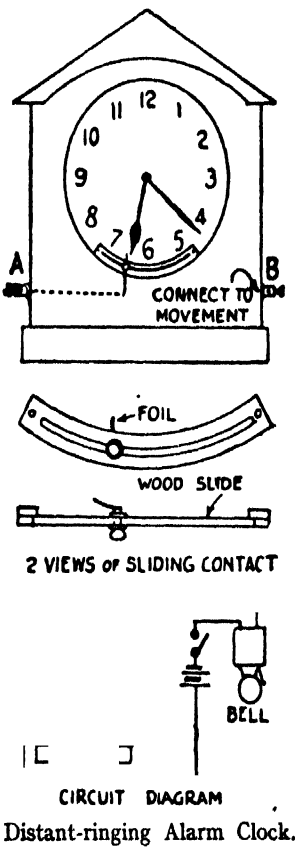
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ALARM CLOCK, DISTANT-RINGING

It will be admitted that it is a big advantage to be able to keep one's alarm clock downstairs in the kitchen or dining-room whilst arranging to have the actual alarm fitted in one's bedrooms. Further, it is possible to have alarms fitted in any number of bedrooms, with a central or master-clock elsewhere. The problem of the maid's clock going wrong at the critical moment appears to be solved by this type of clock. The upper sketch shows the clock described. It will be observed that between the hours of five and seven (the usual hours of household awaking) there is a wooden slide in which can move a contact containing the piece of tinfoil soldered to the end; this makes a springy contact for the hand, so that after making contact the foil springs back. 24 D.C.C. wire is led from the contact to the bell, or buzzer, placed in the room upstairs. The frame of the clock, which is, of course, in connection with the metallic bracket holding the works, and therefore with the hour hand making contact, is connected to one side of the battery, which need be only an ordinary Sac Leclanché primary cell placed in any convenient spot out of sight. It is better to fit a switch placed handy to the bedside in order to switch off the current, and thus stop the bell from ringing continuously. Incidentally, the provision of the switch ensures the sleeper getting up to operate it.



Distant-ringing Alarm Clock.

ALUMINIUM DOMESTIC UTENSILS, TO REPAIR

Aluminium saucepans usually fail in service because of (1) Loose handles which allow the contents to leak out of the rivet holes; (2) holes

through the sides or bottoms, due to accidental damage by sharp implements, falls or blows.

Loose handles are caused by constant use straining the rivets and their holes. Such looseness can readily be cured by placing a flat bar of steel or a tool in the vice, placing the saucepan over same so that the head of rivet is against the flat part of bar and then gently nicking with a ball-ended hammer, known as a peening hammer, as shown in the illustration

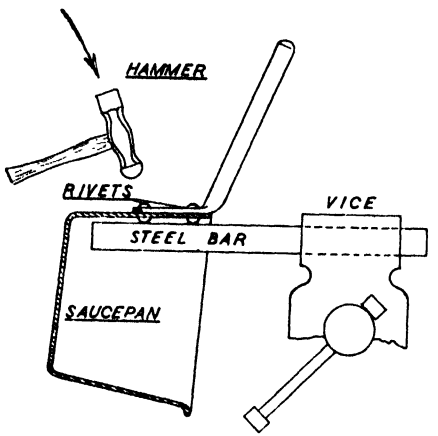


Fig. A.

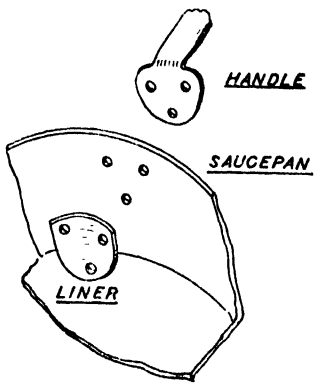


Fig. B.

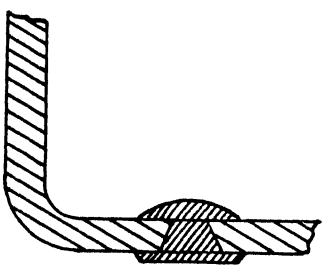


Fig. C.

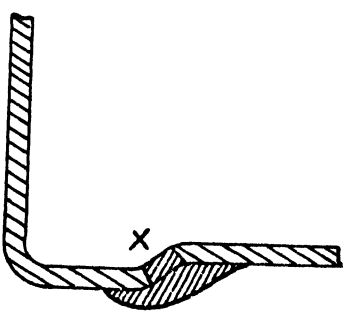


Fig. D.

Repairing Aluminium Utensils.

Fig. A). Test the handle for tightness, after the last rivet has been tightened.

If the rivet holes have become so enlarged that the rivet heads have pulled out, a larger size of aluminium rivet is required, but if not available ordinary nickel-plated bicycle screws, cut to length, will usually be found suitable. Place washers under the heads and have the heads inside, and nuts and washers outside. When tightened up give a few blows to the end of the screws, in the manner shown in Fig. A, to prevent, them from unscrewing.

If the rivet holes in the saucepan are badly enlarged an aluminium liner (Fig. B) should be placed on the inside, to strengthen the metal.

In the case of an aluminium vessel having a hole in its bottom the ideal method of repair is to apply an aluminium solder, using the method described under the heading *Soldering Aluminium*, but if the householder has neither the special aluminium solder nor the blowlamp for the job a good expedient is to obtain a piece of soft aluminium (cut from a rivet) and to rivet this over on either side of the irregular hole, Fig. C. The edges around the latter should first be scraped clean. The aluminium will then expand to fill the hole and to make a liquid-tight joint. Soft solder can also be used, but if the contents "boil dry" the solder will melt and run out. However, with care a soft-solder rivet will last for a long period.

A method of repairing an aluminium hot-water bottle with a narrow neck, which prevented the use of the above method, was to build up the surface below the fracture (shown at X in Fig. D) with successive layers of "cold solder." The latter is a thick paste containing finely powdered aluminium and cellulose varnish. Each layer was allowed to dry thoroughly before applying the next; further, the first layer just bridged the hole and each succeeding layer was about $\frac{1}{8}$ in. larger, all round. The repaired hot-water bottle proved quite satisfactory.

ALUMINIUM VESSELS, CLEANING

Domestic utensils which become stained with vegetable or fruit juices can be cleaned with abrasive washing powders or with fine steel wool sold for this purpose. Surface deposits should be removed with a stiff bristle pot brush. Strong washing soda attacks aluminium, but it can be used for surface cleaning purposes if, after cleaning the surface is washed well in plenty of hot water. A particularly effective cleaner for stained aluminium cooking vessels is the steel wool sold by most hardware shops. Used either wet with soap or dry this quickly effaces stains and other surface discoloration.

ATTACHÉ CASES, TO RENOVATE

Useful articles of the leather variety, such as attaché cases, suitcases, etc., can be renovated by the treatment of linseed oil and lac solution, although they are chiefly of strong leather substitutes, or real leather.

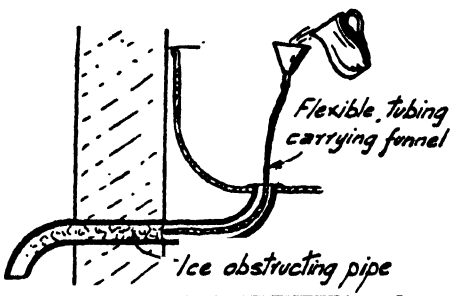
A little aniline walnut stain can be added to the lac solution to obtain the brown shade. But in some cases a little of the dry pigment umber can be mixed with it instead for touching up shabby places; to be stippled or dabbed on with the brush. Generally, the ordinary brown polish solution can be used without any stain; applied in dry, warm air by means of the brush only.

Leather attaché and suitcases can be renovated by first brushing off all dirt, washing any solid deposits off with warm water. Then allow to dry, thoroughly. Next apply a leather or furniture wax polish, liberally, all over the surfaces and then polish off with a clean cloth. Metal fittings which are dull and discoloured should be polished with liquid metal polish and then given one or two coats of transparent cellulose lacquer, allowing

the first coat to dry thoroughly before applying the second one. If the metal fittings have become rusty a good plan to improve their appearance is to give them a coat of fine aluminium paint—as used for cycle parts.

BATH WASTE, TO THAW

During the winter many readers will suffer the inconvenience of having the bathroom outlet pipe freezing, with the great difficulty of thawing the same, as the freezing generally proceeds well into the wall, where the application of hot flannels is an impossibility.



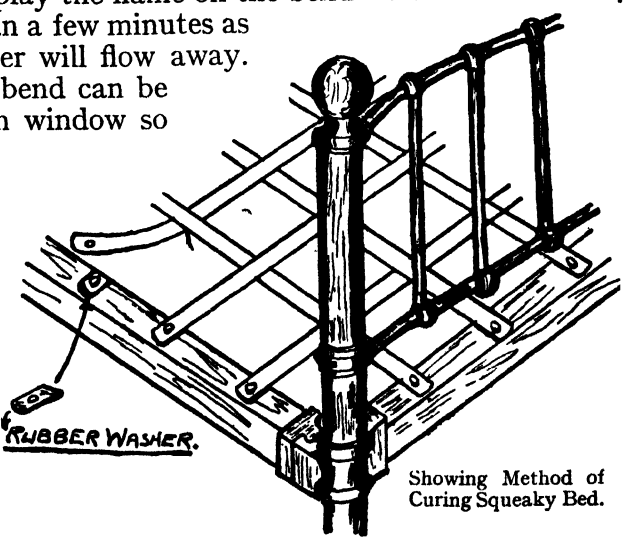
Method of Thawing Waste Pipe.

Perhaps the following method of procedure would be welcome. Procure some small-diameter flexible galvanised gas tubing, fit with a piece of rubber tubing carrying a funnel. Push the flexible tubing through holes in the brass orifice on top of the waste pipe until the end of the tubing comes against the obstructing ice. Pour hot water into the funnel, and continue to feed the flexible tubing through the waste pipe as the thawing of the ice proceeds. The ice will be soon melted through and the water in the bath runs away.

It sometimes happens that the waste pipe is frozen so that the water in the bath will not run away. In this case the remedy is to pour hot water over the exposed outside bend (shown on the left in the illustration) or to obtain a blowlamp and play the flame on the bend until the ice thaws. This will not take more than a few minutes as a rule, when the bath-water will flow away. Usually the outside waste bend can be reached from the bathroom window so that with a long-spout watering-can hot water can be poured over the bend.

BED SQUEAKING, REMEDY FOR

Very annoying is a squeaking bed, and this is pronounced in some of the earlier-type beds. A little cure consisting of a rubber washer cut from old motor wheel inner tubes is very effective on the steel lath-type bottom of a bed. When these laths become used and worn "long" with



Showing Method of Curing Squeaky Bed.

the weight of the sleeper, they "ride" about on the studs in the side rails. Cut a few rubber washers and insert between the lath and sides of the bed, and when weight is applied it causes a damper action on the lath and eliminates the "squeak."

BOILERS, SLOW-COMBUSTION. SELECTION, FIXING, AND MAINTENANCE

Slow-combustion boilers of the Glow-worm type are now so widely employed in domestic households that some information on their selection, fixing, and maintenance will be found invaluable both to prospective and present users.

Slow-combustion boilers will burn small coal, anthracite, or coke; all kinds of domestic refuse can also be got rid of by burning. In an emergency a supply of hot water for a bath can be obtained by rolling a few newspapers into balls of about 3 in. diameter, or twisting into compact rolls, soaking in water and placing in the stove on top of paper already kindled.

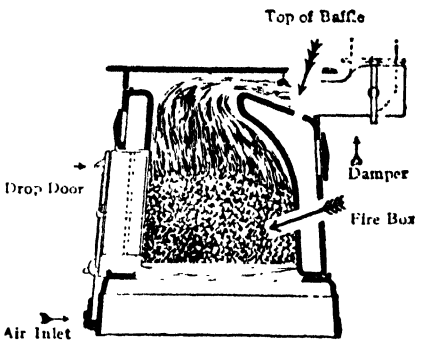


Fig. A.—Showing the Principle of the Slow-combustion Boiler (the Glow-worm).

Selecting the Boiler.—When selecting a boiler for a given house it should be borne in mind that the correct size of boiler will depend upon the quantity of water that it is required to heat. It is usual to express the rating of a boiler by the number of British Thermal Units per hour that the boiler will supply to the water. Thus the smallest size Glow-worm boiler will give 52,000 B.T.U.s per hour; this is sufficient to heat 105 gallons per hour of water at the temperature of the mains up to 100° F., or 52 gallons per hour up to 150° F. Generally speaking, for small houses this No. 1 size is satisfactory for all domestic hot-water supplies required. If, however, hot-water radiators are to be fitted, then the next size (No. 2) should be employed; this gives 70,000 B.T.U.s per hour.

The manufacturers of slow-combustion boilers will generally advise upon the correct size of boiler for any particular requirements.

Fitting the Boiler.—When fitting this type of boiler the flow and return pipes should be chosen of the same size as the boiler tappings. Any reduction of size must be on the vertical piping and not on the horizontal runs or boiler tappings themselves. The flow pipe should be connected by suitable size of pipes into the hot-water tank or cylinder, as near the top as possible. The return pipe should be fitted at the bottom. The cold-water supply pipe should come into the bottom of the cylinder or tank and it should have a horizontal inlet.

All hot-water supplies should be taken from the exhaust pipe and not from the flow pipe.

The circulating pipes should have a rise of at least 1 in. per 10 ft.; if possible a greater rise than this should be given.

Where a radiator or secondary circulation is to be arranged the secondary return should come into the cylinder or tank as near the top as possible.

When making the flue-pipe connections the smoke elbow and all flue piping should have their joints made with fireclay cement, e.g., Pyruma. Where the smoke passes into the chimney or through a register plate make certain that this joint is airtight.

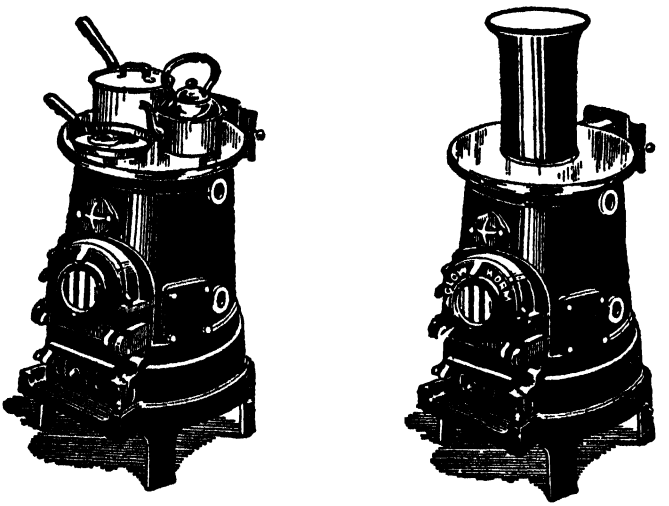


Fig. B.—(Left) Typical Slow-combustion Boiler. (Right) Fuel Hopper, fitted for Long Burning Periods.

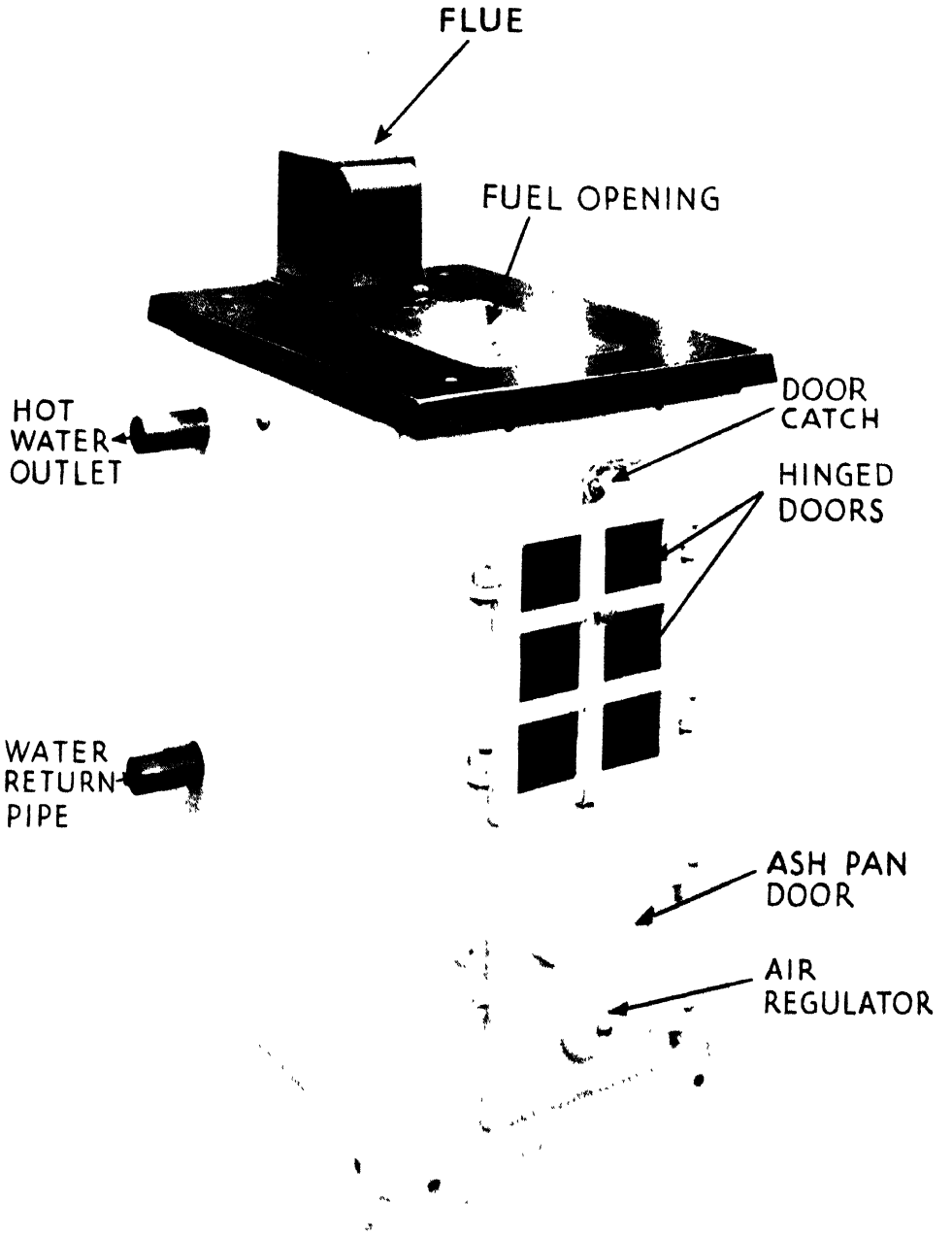
Draining Tap.—It is also important to arrange for a drain-off cock or tap to be fitted in the bottom manhole cover. In frosty weather this tap is used to draw off the water when not using the boiler.

The water should also be drawn off at six-monthly intervals to get rid of any sediment, rust, or deposits in the system.

Care and Maintenance.—The best fuel for most slow-combustion boilers is small coal and coke mixed, small coke alone, or anthracite of about walnut size. Kitchen refuse can also be burnt. To light the stove, first remove all ashes and dust from the firebox and ashpit, and rake out any deposit from the top of the baffle. Lay the fire with paper and small sticks of wood, placing the fuel on the top. Light in the usual way, having the front door open for this purpose. The damper in the flue should be wide open when the fire is lighted. As soon as the paper has caught, close all doors, but leave the lower or ashpit door airslide full open. If it is required to heat up as quickly as possible the ashpit door can be left wide open.

An excellent method of lighting a slow-combustion stove without paper or wood is to use a *gas poker*; these can be bought cheaply at most ironmongers'. It is then only necessary to clean out the ash and any clinker that may be in the firebox. Make up with new fuel to a depth of about 8 in. Light a flame about 6 to 8 in. long on the poker and push the latter under the front firebar. In this case the damper should be wide open; the front and ashpit doors should also be open.

When the fuel is well alight withdraw the poker and shut the front and ashpit doors.



DOMESTIC BOILER

To check the fire from burning too rapidly the damper can be partly closed (by pushing it in), and the air inlet in the ashpit door closed. In the Glow-worm boiler the damper is so designed that when pushed right in it does not completely close the flue opening, thus obviating any risk of dangerous gases in the room. When it is desired to keep the fire alight all night the shaking bottom should be used vigorously, and the draught through the boiler increased until the fire is red-hot. The firebox should then be filled up with new fuel, and where a hopper is used the hopper should be placed in a suitable position; all the doors and the damper should then be closed. In some cases the damper requires to be left open a little.



Fig. C.—A Damper Flue-pipe Fitting.

A good tip when arranging for the fire to be kept in for a long period is to fill up about two-thirds way with fresh fuel, then place damped house and sink refuse, e.g. vegetable refuse, tea-leaves, wet paper, etc., on the top of the fuel, right up to the top; close all doors and the damper, and shut the air supply in ashpit door right off.

The ashes that drop through the firebars should be removed at intervals of about twelve hours. The shaking bottom of the furnace should be used frequently to facilitate the disposal of the burnt ash; clinker will always form on the firebars if this is not done. Ash, cinder, and small fuel must not be allowed to collect between the firebars and the front door, or the bars will burn out. When using slow-combustion stoves during the day do not fill the furnace right up with fuel. The greatest heat is obtained from a red fire about 5 in. high from the bottom grating. To maintain this maximum heating effect, a shovel of fuel at a time should be added so as not to deaden the fire.

Some Miscellaneous Hints.—It is always advisable to fit a safety valve to domestic boilers; this valve should be cleaned at least once yearly. All pipes should be aluminium painted, and the stove itself either blacklead or aluminium painted. See that there is at least 8 in. all round between the stove and the brick wall; no timber should be allowed nearer than one foot.

In order to obtain the greatest heating with the smallest fuel outlay, all hot-water pipes should be lagged with felt, and, preferably, encased in wooden channels. The hot-water tank should be arranged in a suitable cupboard; otherwise it should be lagged with felt or a similar non-conducting material.

All hot-water pipes should be as short as possible and with the minimum number of bends and turns.

A Typical Domestic Hot-water Installation.—Fig. D shows a typical domestic hot-water installation for a small slow-combustion boiler, such as the Glow-worm.

The pipe sizes are suggested as being customary with a small boiler. The safety valve is marked S. The flow pipe from boiler might be

1¼ in. if the water is hard and deposits lime. The size of cylinder has also to be guessed, but if only one bath is taken per hour, 25 gallons' storage will suffice. If two successive baths are taken, the storage should be 35 gallons. The hot draw-off branch is dropped to run on the bathroom floor. If it is run along the bathroom ceiling, the outflow (yield) at the bath tap will be irregular. A square tank can be used for storage, if preferred, instead of a cylinder, as the water pressure is low. Tanks are cheaper than cylinders. The stop valve in the cold supply must be of the full-way kind, but it may be omitted if desired.

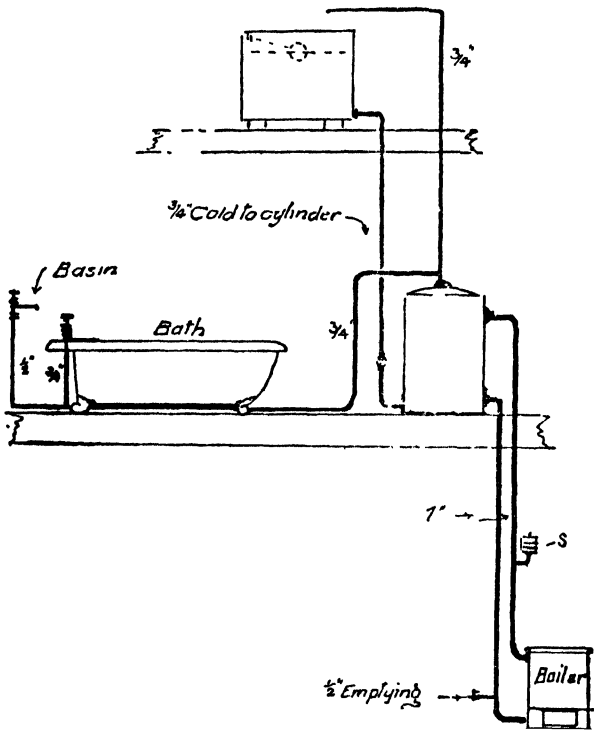


Fig. D.—A Suitable Domestic Arrangement of Hot and Cold Pipes, and Tanks, for a Slow-combustion Boiler.

BRASS, TO CLEAN

One of the best methods is the following:

Mix one part of common nitric acid and one-half part sulphuric acid in a stone jar, having also ready a pail of fresh water and a box of sawdust. The articles to be treated are dipped into the acid, then removed into the water, and finally rubbed with sawdust. This immediately changes them to a brilliant colour. If the brass has become greasy it is first dipped in a strong solution of potash or soda in warm water; this dissolves the grease, so that the acid has free power to act.

Another method is to use a specially prepared paste made of 9 parts of petroleum jelly, 3 parts of kieselguhr, 1 part of refined paraffin wax, 1 part of refined chalk, and 5 parts of sodium hypophosphite. Another good paste is made by using rottenstone 6 oz., oxalic acid 1 oz., and equal parts of very good enamel oil and spirit of turpentine to make a stiff paste.

BRIQUETTES, COAL DUST

Coal dust, in order to form the material for briquettes, can be mixed with equal proportions of sawdust and clay, using sufficient water to bind it. After moulding the mixture into briquettes, balls, or ovals, these should be dried in an oven; when used on a fire they consume slowly and give out a good heat.

Coal dust may be mixed with ordinary cement in the proportions of eight parts coal dust to one part cement. Water is then added, gradually, until the mixture can be formed into a thick pasty mass, rather on the dry side. It can then be moulded by hand into convenient-sized balls or ovoids and allowed to dry hard in the air. Wooden moulds can readily be made so that a quantity of balls or ovoids can be moulded at the same time. Equal parts of sawdust and coal dust mixed with the same proportion of cement, namely, one-eighth the total volume of the sawdust and coal dust, can also be used. If required for early use the balls or ovoids can be dried in an oven. A mixture of peat fibre and coal dust made into a plastic mass with water can also be used to make slow-burning fuel.

BUCKSKIN SHOES, TO CLEAN

White buckskin shoes which have become soiled with mud or grass stains may effectively be cleaned by rubbing with a rag soaked in benzene or petrol, afterwards applying one of the proprietary white shoe dressings.

Another good method of removing stains is by the use of the "cloth ball" sold in most hardware shops.

A liberal application of pipe-clay and water will also clean and whiten buckskin shoes.

A good white shoe dressing may be made by mixing the following ingredients together: cream of tartar, 1 oz.; alum, ½ oz.; oxalic acid, ½ oz.; milk, 1 pint. This preparation is rubbed on to the shoes. When the shoes are dry they should be rubbed again with a mixture of precipitated chalk and magnesium carbonate.

CANE CHAIRS, TO CLEAN

Cane chairs should be washed with warm water only, using a scrubbing brush. Do not use soap, for the grease in this will be absorbed by the cane and the latter made unpleasant. Cane chairs that have gone very bad in colour should have a little oxalic acid in the water; about a teaspoonful to a bucket will often clean them up afresh.

CANVAS SHOES, TO CLEAN

A method of cleaning canvas or buckskin shoes is to apply a mixture of 2 parts of prepared chalk, 1 part of zinc oxide mixed with sufficient gum tragacanth paste in water—very little gum is required—to make a block when dry. The cleanser is applied with a wet brush and the shoe is left to dry.

CARPET CARE

The life of a carpet depends almost entirely on how it is treated and taken care of. A carpet should be well washed from time to time in some reliable preparation. A reliable carpet wash may be made up in the following manner:

Add about 2½ lb. of soft soap to ½ gal. of water and well boil, afterwards

adding a good ½ lb. of gelatine. Allow this mixture to cool, and then add 1 pint of ammonia, and keep the compound in an airtight tin. It is a good preservative.

To wash the carpet, dissolve some of the compound in hot water, and well wash, using a soft cloth or brush.

When it is desired to store a carpet, never fold it over, but always roll it. The moth detests ordinary printers' ink, so it is a good plan to roll sheets of newspaper in with the carpet, and finally to roll a few sheets on the outside.

Dust and grit are a carpet's great enemies, and every possible means should be employed to get rid of them. Where electricity is installed, a good electric suction cleaner may be used on the carpet about once a week to remove all dust and grit, thus preventing the latter from being trodden down and cutting the carpet pile.

When a carpet shows slight signs of wear, a few little repairs may easily be undertaken. For instance, when the selvedge becomes frayed, it may readily be drawn together, and a few stitches here and there taken in time will add much to the carpet's life.

CASTOR REPAIRING

The repairing of castors for chairs and tables should be done as follows:

To make a really sound job, the end of the leg should be sawn off and a new one made out of a piece of hard wood, either beech or ash being suitable for the purpose. The new piece—which is shown in Fig. A—can be turned on a lathe if facilities are available, or can be made quite well by hand by paring it out with a chisel and wood file if a little care and trouble is devoted to the operation, although it is obvious that the former method is preferable. A large hole, 1 in. or thereabouts in diameter and 2 in. deep, should be bored in the end of the table leg, the size of the hole being necessarily governed by the thickness of the leg.

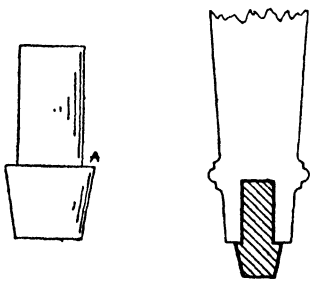


Fig. A. Fig. B.

Method of Plugging Leg for Castor.

The new piece should be prepared so that one end can be driven fairly tight into the hole just bored, a narrow shoulder being left as at A to support the table leg afterwards. The other end must be pared down to fit closely into the socket of the castor without any possibility of lateral movement, so that the socket cannot move from side to side. In Fig. B the new piece of wood, after it has been placed in position, is indicated by heavy black lines, the existing table leg being shown by the fine lines. The new piece should be well glued before insertion, and must be driven in until the shoulder beds firmly against the end of the leg. The castor is then put on by tapping it carefully with a hammer, and the screws round the side of the socket can then be replaced.

CEILING CLOCK

The ordinary illuminated watch or clock is only satisfactory at night when placed quite close to the bedside, where in many cases the ticking of the mechanism is apt to become a nuisance. To obviate this a new device for actually projecting a large illuminated image of the clock or watch face on to the ceiling has been invented. In this case the watchstand (Fig. B) contains an electric lamp C for illuminating the watch dial, a reflecting surface G, and a projecting lens H. The watch is just rested on an inclined plane having a large aperture for the watch face. It is projected by the lens H on to the ceiling, where, greatly magnified, the image of the watch face, formed by the reflection in the mirror G of the face of the watch, figures, and hands appears. Current for the lamp C is supplied by the battery D. When it is necessary to determine the time, one merely depresses the switch E which completes the lamp and battery circuit. The parts are mounted on a wooden base A with a metal cover B. The lens H is a double-convex of 4 in. focus.

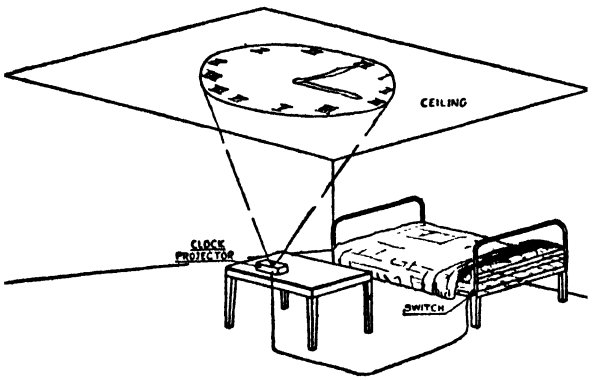


Fig. A.—Making a Ceiling Clock.

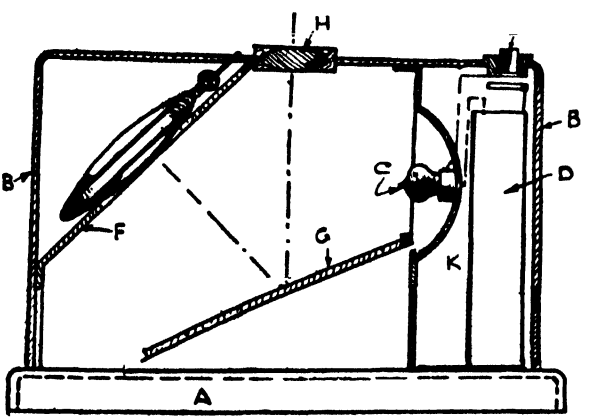


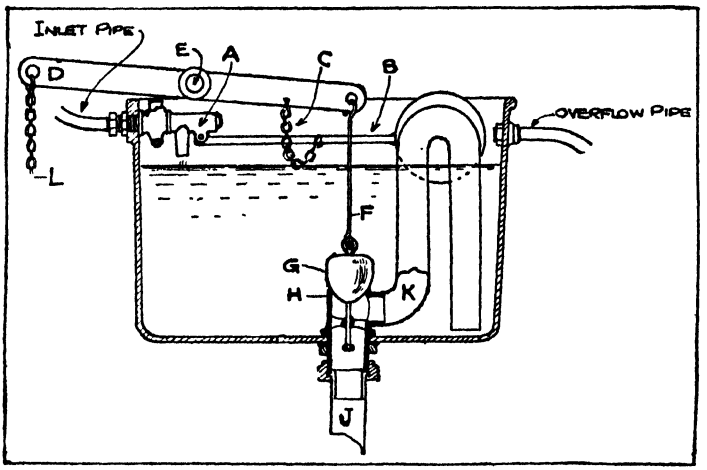
Fig. B.—The Watch-projection Apparatus.

CISTERN FOR FLUSHING

The accompanying illustration shows the action of both the ordinary domestic water supply cistern and also of the flushing type. The particulars given will be of service to the amateur who may wish to do his own cistern repairs.

In the case of the water supply cistern the level is maintained by a ball float operated valve, the float lever of which drops when water is drawn off, thus operating a valve at the inlet pipe, and automatically closing this as the water rises. A similar ball cock is shown in the sketch of the flushing

cistern, and the action of this cistern is as follows : Suppose the cistern to be empty, the ball float lever B has fallen and the valve A is open, admitting water from the inlet pipe to the cistern, which as it fills floats up the lever until a predetermined level is attained and the valve is arranged to be fully closed. If the chain L is now pulled and let go the lever D pivots on its fulcrum E, lifting the plug valve G via the wire rod F from its seating H, allowing a quantity of water to flow down the flushing pipe J. On the return of the valve plug to its seating the flow is suddenly arrested, causing a vacuum to be formed under the valve and in the siphon pipe K over which the remaining water in the cistern is drawn until this is emptied and the filling process repeated as before. The chain C serves to prevent the float lever falling too far and jamming the valve, and the overflow pipe is arranged at such a level as will prevent the cistern spilling over due to inlet valve leakage or the float lever not shutting off soon enough due to a worn valve washer or wear on fulcrum pin.

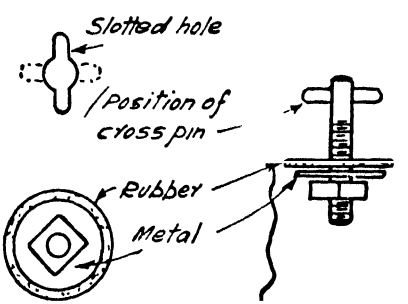


Mechanism of the Ordinary Flushing Cistern.

CISTERN REPAIRS

A cistern with leakage from a rivet can be repaired as follows :

First empty tank, then the rivet is filed or drilled out; then obtain a suitable-sized screw with nut, and file the head flat, as shown in sketch. Drill and fit a little cross-pin through head. Next file the hole in tank like a slot, until the cross-pin can just be inserted inside the tank. Then obtain a rubber washer of a size to well cover the slotted hole, also a similar washer of metal. Place on screw with rubber washer next to tank, insert screw through slot and turn cross-pin round until it is at right angles to the slot in tank. Hold the end of screw with a pair of pliers to prevent



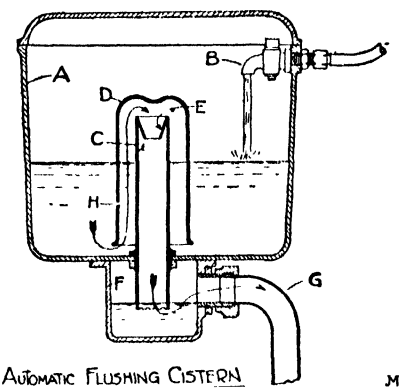
Method of Repairing a Leaky Cistern.

it turning round while tightening up the nut. The rubber will make a watertight joint if tightened up well. The rest of the screw can be cut off if necessary.

CISTERNS, AUTOMATIC

There are many types of automatic cisterns on the market working on the siphon principle, but the following explanation and attached sketch may be taken to give a general idea of their action.

A tank A with continuous-flow cock B has a stand pipe C surmounted by a larger pipe D arranged in such a manner as will form a siphon. At the top of C is a small truncated cone E and the bottom end is nicked where it dips into the water in tank F from which the flushing pipe G is led.



Showing Action of Automatic Flushing Cistern.

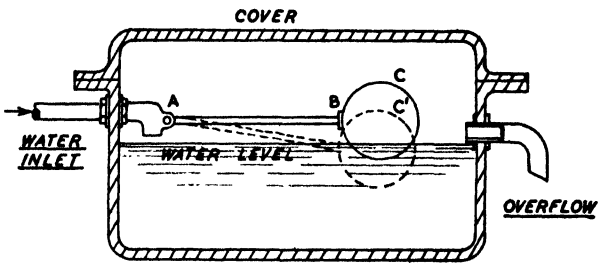
Action of Cistern.—The action of the cistern is as follows: Water flows into tank A through cock B and rises up inside the siphon, compressing the air in same and displacing it down pipe C, and through the slight water seal in tank F. Upon the level of the water reaching the lip at the top of standpipe it trickles down this and, dropping from the small end of the cone through space, it gathers air and carries it away through the water seal until a partial vacuum is formed, whereupon the atmospheric pressure on the surface of the water in tank A overcomes the inertia of the water in the siphon and the flush commences. To break the force of the flush and prevent the water-seal tank being emptied, a small snifting hole is drilled in D and H, allowing a small amount of air to enter at this point once the water level has lowered to its level, thus reducing the vacuum in the siphon and incidentally the velocity of the water in same. The flush ceases when the water level is down to the bottom of D and the process of filling up the tank is repeated, the space of time between the flushes being governed by the rate at which the water is allowed to enter the tank. The idea of the cone at the top of the standpipe is that the water flowing through same is forced to fall through space and not run down the wall of the pipe, as should this happen it would be impossible to form the requisite vacuum.

CISTERNS, TO PREVENT OVERFLOW FROM

A common source of trouble with domestic lavatory and roof tank cisterns is that after a certain period of service the water starts to overflow from the outlet pipe. This is usually due to wear of the seating or rubber washer.

Referring to the illustration which shows the position of the ball float and arm ABC when the water level is practically at the same horizontal level as the lower part of the outlet pipe, the method of curing this trouble is as follows :

In the case of a lavatory cistern, remove the cover from the top; it is usually held by two screws and nuts. Then place one hand under the end of the ball cock arm at A and press down with the other hand gently at B near to the float. This will cause the arm—which is of soft brass or copper—to bend a little downwards so that the float will then assume the dotted position shown at C'. The result will be to lower the water level. It may be necessary to make one or two trial settings so that the level will not be too low, or the flush may not operate. Usually there is a water-level mark on the inside of cistern for setting purposes; if not, set the level to within about a ¼ in. below outlet pipe's lower inside bore.



Altering the Level of Water in Cistern, to prevent Overflowing.

To raise the water level, bend the float arm upwards at B.

CLOCK MAINTENANCE AND REPAIR

There are many types of clocks upon which the amateur may successfully try his skill, but whichever he starts work upon, he must be guided by two golden rules. The first is that he can *never be too careful* in his handling of a clock; and the second is that the more thoroughly he examines the mechanism with its various actions, the more likely is success to attend his efforts.

To carry out the work dealt with, a few special tools will be necessary, and these can be summarised as follows : Large flat pliers with 1 in. jaws; small ½ in. pliers; small cutters; tweezers; two screwdrivers including one with a fairly long handle; a small hand vice; a hard and soft clock brush; a quantity of "peg-wood"; a bottle of clock oil; and some tissue paper.

If a bench is to be rigged up, it must be in a position where good light is available, and must be absolutely rigid. A small vice with parallel jaws can be fixed on the right-hand side.

All the tools mentioned are best obtained from any of the clock centres in London or Birmingham, at relatively low costs.

Cleaning an English Dial.—Commence work by removing the pendulum hands and dial. The movement will then appear as in Fig. A (Plate facing this page) and the motion work A, B, C can be removed.

Screw off the part D, and take out the pallets E. The movement will then run down, and the final tension of the mainspring is taken off by

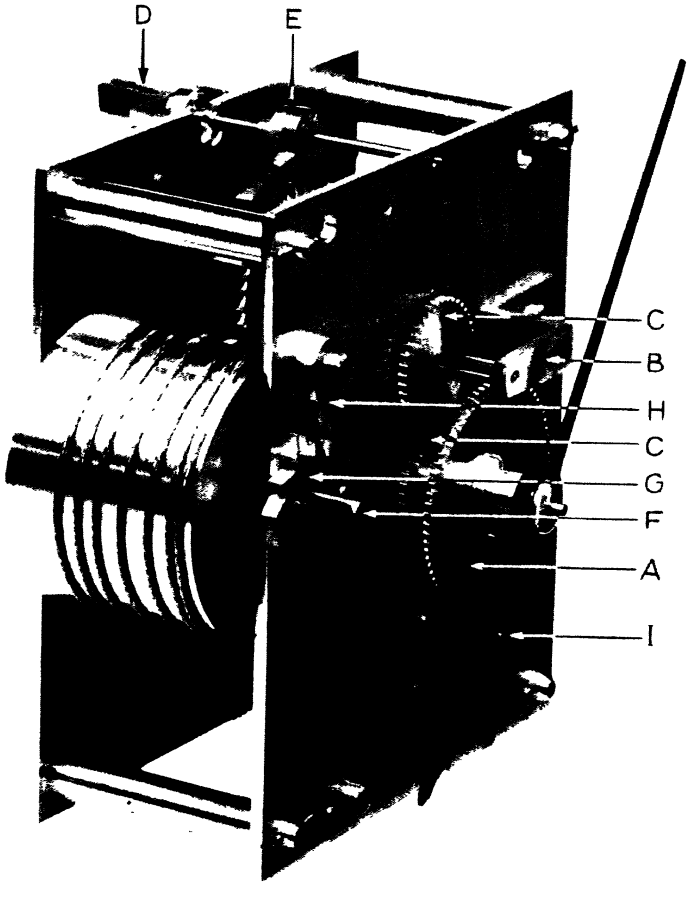


Fig. A. Illustrating the Cleaning of an English Dial Clock

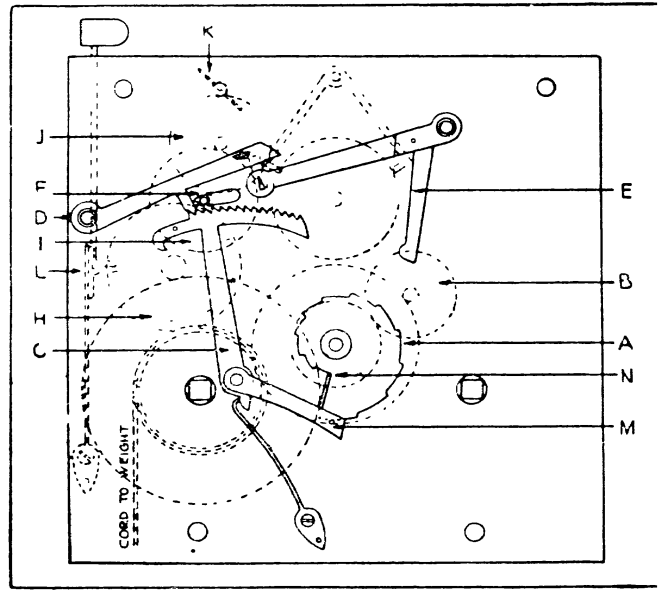


Fig. B.—H, Pin Wheel; I, Locking Wheel; J, Warning Wheel; K, Fly; L, Hammer

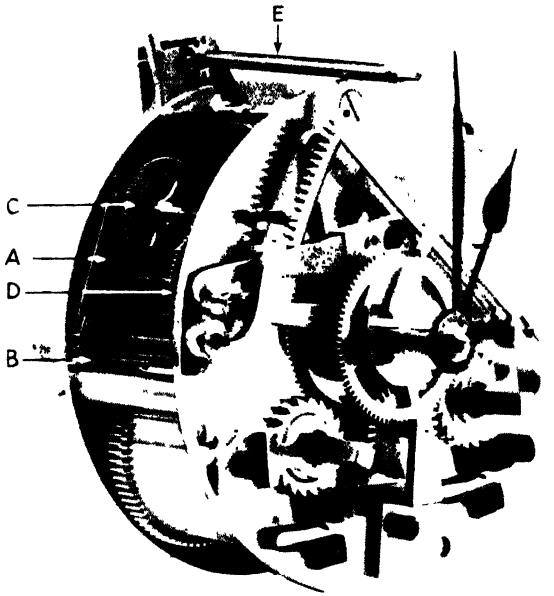


Fig. B — General View of French Striking Clock Mechanism

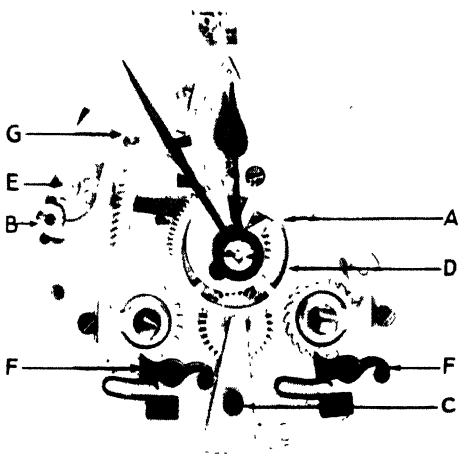


Fig. C — French Striking Clock Movement

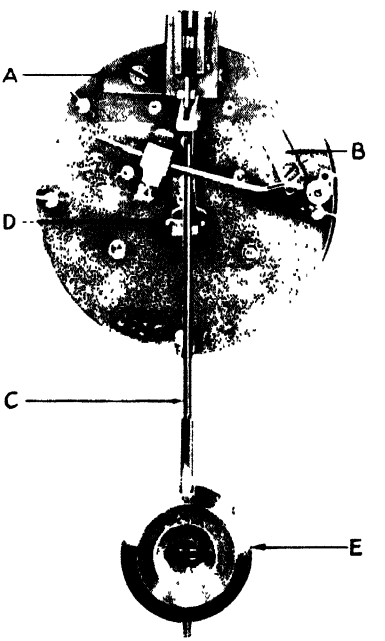


Fig. D — Pendulum of French Striking Clock.

fixing the arbor F in a hand vice, and turning it in the same direction as the ratchet teeth G. This will disengage the click H, and the spring can be let gently down. The ratchet and click can then be removed, the plates unpinned, and the movement completely dismantled.

A clock of this type can be cleaned with metal polish, and finished with dry chalk. Rust can be removed with fine emery-paper, and pinions cleaned out with a piece of "peg-wood"—sharpened pencil fashion. All the holes in the plates must be thoroughly pegged out, the mainspring re-oiled, and the winding work inside the cone-shaped "fusee" cleaned and slightly oiled.

Assembling.—The centre wheel is put in first, then the others in the opposite order of dismantling. The barrel arbor should be oiled at each end before assembling.

Examine all wheels for freedom, and wind the line round the barrel until its whole surface is covered. (It can be noted here that all wheels in clockwork should have perceptible "in-shake" between the plates.)

Wind up the ratchet G about two complete turns, and screw the click tight in position. The pallets and part E, D are then replaced, and the clock wound up from the square I—care being taken to guide the line in its correct position on the fusee.

The movement is next oiled. Bearings only are oiled—in the sinks provided—and also the acting surfaces of the escapement. Apply the oil with a thin wire flattened at the end.

The motion work, dial, and hands are now replaced, and the clock can be set up.

Adjusting Pendulums.—The form of suspension shown in Fig. D (Plate facing page 263) is common to all clocks.

The spring must be straight and free from buckles, and its fitting must be free enough to allow the pendulum to hang parallel with the movement, and yet have no side play.

The rod C must be a free fit in the slot D and this contact should be oiled slightly.

The bob E must be a smooth fit on the rod, and the rating nut should be quite firm on its thread.

To get the beat of a clock equal, bend the arm of the crutch D slightly to either side as necessary.

All pendulum clocks are regulated by screwing the bob *up* if the clock loses, and *down* if it gains.

Dismantling a Grandfather.—After detaching the weights and pendulum, the movement is taken off the seatboard by removing the two thumb-screws securing it, and the dial and hands can then be taken off.

Remove the motion work A, B (Fig. B), the rack M, warning lifter E, rack hook D, and gathering pallet F. The plates can then be unpinned, and the movement taken to pieces.

If very dirty, a good cleaning medium is made of a paste of powdered bath brick and a machine oil, after which metal polish can be used, finishing off with chalk.

Adjusting a Grandfather.—After assembling the wheels, and pinning up, oil the front plate. Then replace the motion work, A, B, and the parts E, M, D, F. When the part F is resting on the pin in the rack, the pins of the wheel H should be clear of the hammer L and the pin in the wheel J should be near the edge of the plate. To obtain this position it may be necessary to unpin the plates, and move the wheels a tooth as required.

At 1 o'clock the rack should fall on the centre of the highest step of the snail N, and it will then be correct for the other hours.

Having adjusted the striking, the dial and hands can be replaced, pallets fitted, and oiling completed on the back plate. All striking pins should be oiled slightly, and also the hammer spring where it actuates the hammer.

In setting up a grandfather, the case must be absolutely rigid, and there must be ample clearance between the back of the case and the pendulum. Care should also be taken that the weights have a clear fall, and that they do not touch the floor when fully down. The pulleys should be oiled, and of the two weights, the heavier is hung on the striking side.

French Striking Clocks.—In Figs. C, D, and E are shown the striking mechanism of a French clock. These movements are usually held by two long screws at the back, which when removed will enable the movement to come bodily out from the front.

After removing the dial and hands unscrew the part C (Fig. C) and remove the parts A, B, D, E, and G. The springs can be let down half a turn at a time with the key, by the clicks F, and the ratchets can then be removed. The hammer comes off next and the part A (Fig. D), after which the plates can be unpinned and the movement dismantled. Mark the barrels to prevent getting them mixed.

These clocks are best cleaned with metal polish and dry chalk, and will require very careful handling.

Assembling a French Clock.—When cleaned, the movement should be handled in tissue paper to prevent finger marks. Oil the barrel arbors and assemble in the following order : centre wheel, two barrels, large going wheel, large striking wheel, third and escape wheels; striking pin wheel, locking wheel, warning wheel, fly, hammer, and locking lever.

Pin the plates together, oil the front, and replace the parts E, B, A, C, D (Fig. C) in that order.

When the wheel C (Fig. E) is resting on the locking lever A the hammer must be free, and the warning pin near the edge of the plate. This adjustment can usually be obtained by unscrewing the part B (Fig. D) and moving the pin wheel as necessary.

The winding ratchets can now be replaced, and if the striking is wound

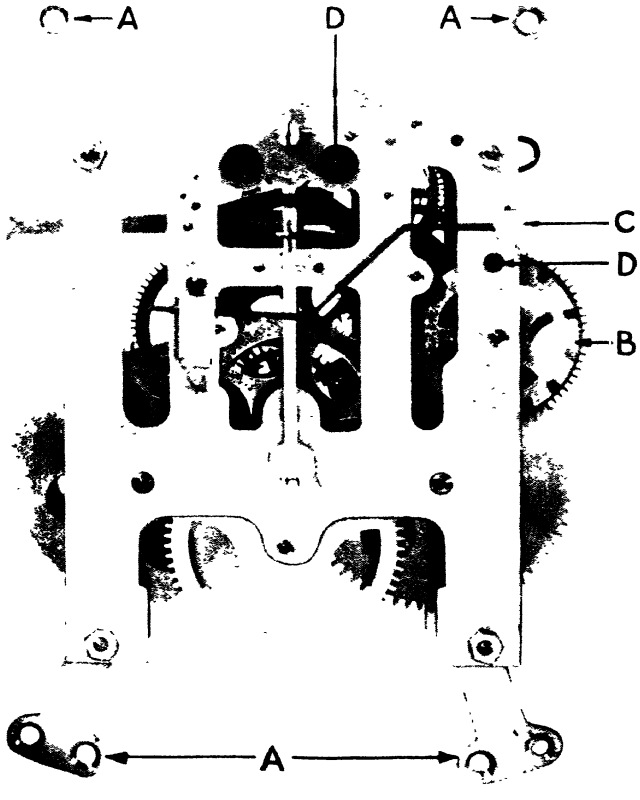


Fig. F—Foreign Striking Clock Movement, section

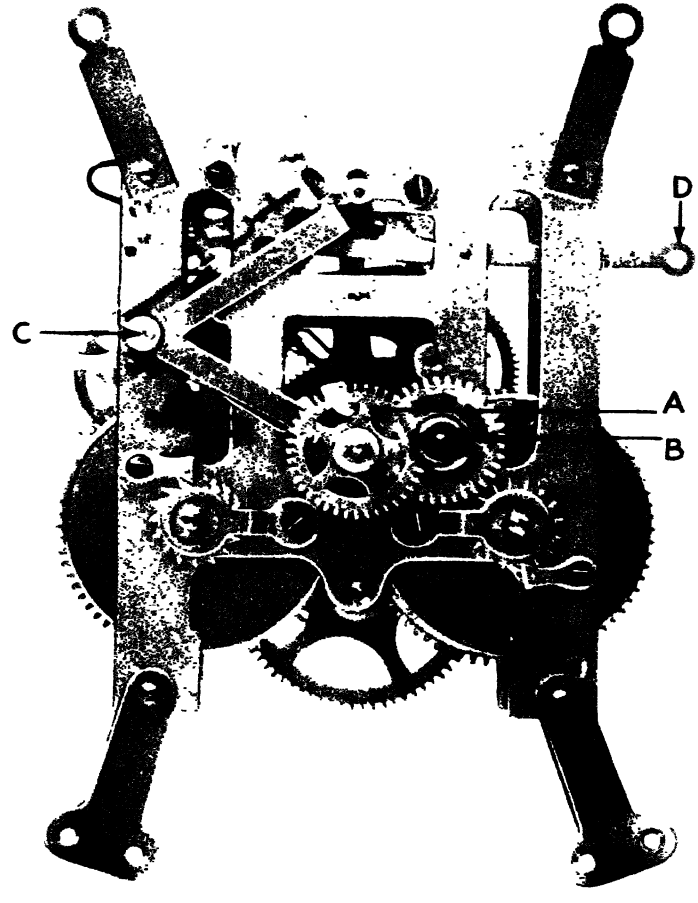
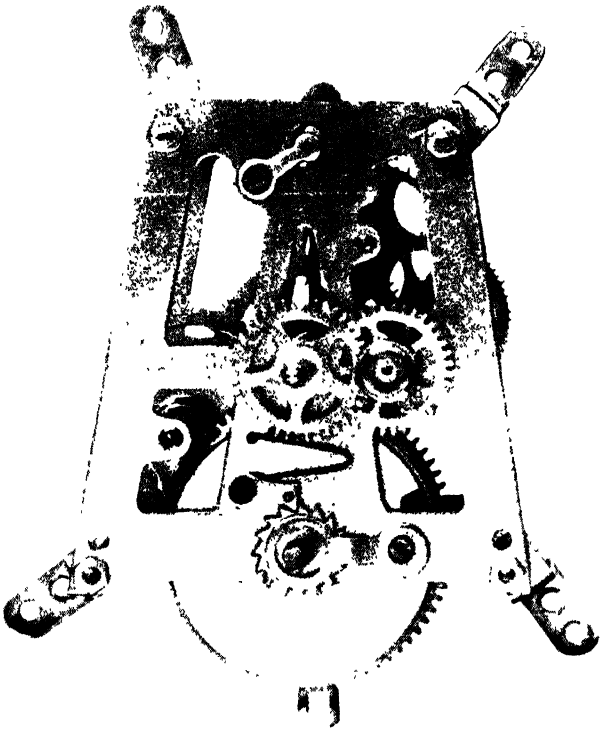


Fig. G—Foreign Striking Clock, front view



A Simple Going Barrel Clock

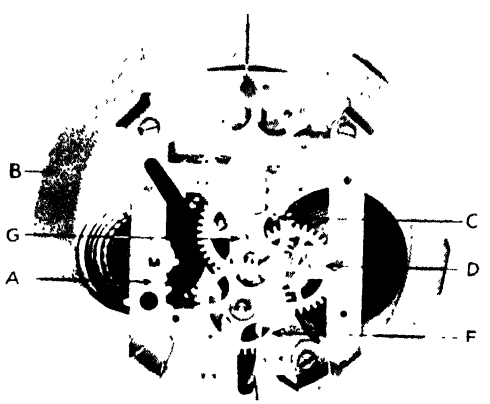


Fig. 1.—Mechanism of Ordinary Alarm Clock.

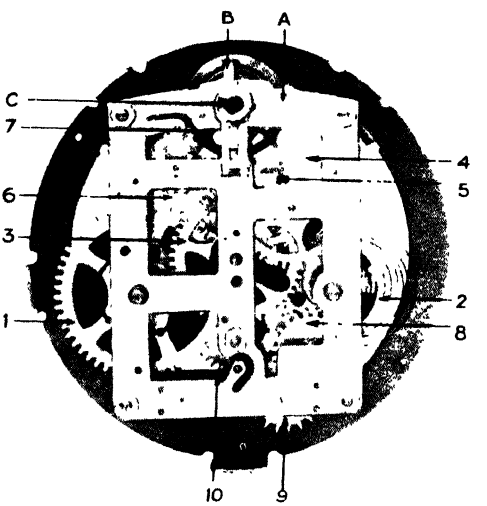


Fig. 2.—1, Great Wheel; 2, Alarm Wheel; 3, Centre Wheel; 4, Third Wheel; 5, Fourth Wheel; 6, Escape Wheel; 7, Pallets; 8, 9, 10, Alarm Wheels and Pallets.

a little, it will automatically assume the position in Fig. E. The part G (Fig. C) can then be put on, with its tail in an opposite direction to the rack teeth.

Fig. C shows the correct position for 12 o'clock, and Fig. E the position for 1 o'clock. Obtain these by unscrewing the part C (Fig. C) and altering the position of the hour wheel D.

The dial and hands can now be fitted, the pallets put in from the back together with the rod E (Fig. E) and cased in.

Foreign Striking Clocks.—A form of striking clocks commonly used is shown in Figs. F and G. (Plate facing page 264.)

The movement is secured by screws in the lugs A (Fig. F), and to take it out the hands must first be removed.

The parts A, B, C (Fig. F) are then taken off, followed by the hammer C (Fig. G).

Care must be taken in letting down the springs, as they are extremely strong, and may easily slip. Take out the pallets by unscrewing the part D (Fig. G) and the movement can then be dismantled by removing the four pillar nuts.

These clocks are not highly finished and are best cleaned with petrol. To assemble, follow the same procedure as with the French movement and note that the lever D (Fig. F) is this time put in with the wheels. When the striking is in its normal position the bent end of this lever must fall in the centre of the notch provided for it in the wheel next the count wheel B (Fig. G). This position can be obtained by loosening the plates and moving the wheel as required.

Fig. G shows the position at 6 o'clock. Strike it round until 2 o'clock, and see that the hook D falls directly in the centre of the single tooth in that part of the count wheel. It will then be correct for the other hours.

Oiling and casing in can be proceeded with as already described, and the hands fitted after the movement is screwed in. The position of the hands is determined by that of the count wheel.

If these clocks should go wrong in the striking at any time, they can be corrected by depressing the part D (Fig. F) (which is accessible from the back) and allowing the clock to strike until the hands coincide.

Going Barrels.—A simple form of timepiece is shown in Fig. H (Plate facing this page), so called because the motive power is conveyed direct to the wheels instead of through the medium of a "fusee" as in the English dial.

No special instructions are required for it, and those already given can be applied to its cleaning and assembling.

Alarm Clocks.—The works of an ordinary drum alarm are shown in Figs. I and J. After removing the keys and sets, the bell and feet can be unscrewed; the back will then pull off, and the movement lifted out.

Lever the hands off gently with cutting pliers, and unpin the dial, after which the movement will appear as in Fig. I.

The only adjustment to note is that of the stop-work A. To dismantle the movement, remove the wheels C, D, E, the frame B, and the stop-work A (Fig. I).

The balance is taken out next by unpinning the hairspring from the stud A (Fig. J) and loosening the screw F (Fig. I) until the balance is free.

The mainspring must now be let down by screwing on the key, and gripping it in the hand vice. The click spring can be lifted to free the click, and the act of winding will then disengage it, and allow the spring to come down. A piece of wire or cord should be tied round the spring before letting down, but the small alarm spring need not be so treated. There is a small pinion under the wheel C (Fig. I) and this can be driven off after the movement is in pieces by smartly tapping the arbor G.

The movement will come to pieces by unscrewing the pillar nuts, and cleaning can then be proceeded with. Petrol can be used for this. Special care must be taken with the balance, and its two bearings should be thoroughly "pegged out."

Assembling an Alarm.—Commence by putting in the great wheel, and alarm great wheel with mainsprings attached. Then follow the centre wheel, third and fourth wheels, escape wheel, pallets, two alarm wheels, and alarm pallets (Fig. J). After screwing together and examining for freedom, the balance can be put back and the hairspring repinned, care being taken to see that the pin in the balance works in the notch provided for it in the pallets. The hairspring must be put through the regulator B (Fig. 10), and to get the beat equal, the spring must be shortened or lengthened as required, from the pin at the stud A.

Oiling is the next operation, and the whole movement can be done at once—including the mainsprings, pallets (on the acting faces), and, very slightly, the pin in the balance. The alarm should be well oiled, but no oil must be placed on the hairspring.

Now replace the motion-work C, D, E (Fig. I), taking care not to drive the small pinion on the arbor G too near the plate. The top-work A must be replaced so that it gives three revolutions.

Adjusting an Alarm.—The frame B and dial can now be fitted, and the alarm index hand put on. Wind the alarm up and set it round until the hammer is released. The hour hand must then be put on at the exact time of going off, and the minute hand will coincide. Greater accuracy will be obtained if the alarm is made to come off at a given hour, and the hands can then be put on exactly at the hour.

In casing the movement it may be necessary to adjust the hammer, so that it rings properly, and this will be done best after the movement is screwed in, and before putting on the back.

The Care of Clocks and Watches.—All the clocks dealt with—save the alarm—are 8-day ones, and to obtain the best results they should be wound regularly once a week.

The hands of all English and French clocks *with rack-striking mechanism* and all *timepieces*, if properly adjusted, can be turned backwards or forwards without injury to the clock. Many foreign clocks are also fitted with "set-back" devices.

As a general rule, it is wise not to turn the hands backwards, unless one is thoroughly conversant with the mechanism. The hands of any clock, however, can be safely set back at certain times, viz. from 15 minutes to the hour to half past, and from 15 minutes past the hour to the half-hour. At these times the striking mechanism is not in action, and therefore no harm can be done.

Clocks should be wound with a key which fits well. If at all loose the key will damage the corners of the winding squares, and may eventually lead to a serious accident by slipping.

In moving a clock, the pendulum should always be taken off, otherwise the suspension will be liable to damage.

Watches.—It is not advisable for the amateur, however skilled, to undertake the cleaning or repair of watches, for, apart from the special skill required in handling very small parts, a technical knowledge is demanded which only years of patient learning and experience can produce.

A few hints on the care of watches, however, can be specially appreciated by the amateur.

It is immaterial when a watch is wound, but the morning would appear preferable, since one will then have the watch in use when the mainspring is exerting its maximum of energy.

The term "over-winding" a watch is really a misnomer, since few watches nowadays can be over-wound. Sometimes the act of winding will stop a watch, but in all probability the stoppage is traceable to some other defect exaggerated by the act of winding.

When the mainspring of a watch breaks—which it is liable to do at any moment, under any circumstances—the occurrence can be verified by winding, when it will be found that the operation is apparently endless.

If the hands of a watch are properly fitted, they can be turned backwards without injury.

All watches should be wound *regularly*, and cleaned at least once a year. Users of pocket watches should not carry anything else in the watch pocket, and should clean it out periodically.

When a watch fails, through any cause, it should not be tampered with, but entrusted to a skilled repairer for correction.

If a watch has had sea water in it, no delay should be made in sending it to a repairer and if there is none convenient, it should be immersed at once in oil.

CLOCK SPRINGS, USES FOR

There are many uses to which broken clock springs of varying widths and thicknesses may be put, and the examples illustrated and described

are selected with a view to helping the average handy man in jobs he can do about the house and for his own use in the workshop. Old mainsprings which have broken either at the centre holes or at the ends, in the cheaper variety of clocks, are of no use to the clock repairer; they can, therefore, be secured from him at trifling cost.

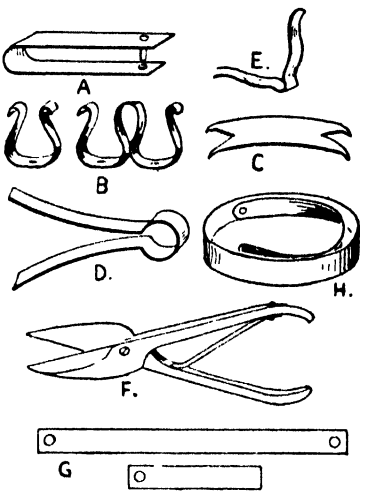
Alarm springs (that is, those taken from alarm clocks) vary in widths from $\frac{3}{8}$ in. to $\frac{7}{8}$ in., and can be termed "good-tempered," as it is possible to curve and bend them into almost any form. These, therefore, form the best type of spring with which to experiment. The spring to be bent should be held between two pairs of pliers, on either side of the contemplated bend. The pliers held in the right hand should preferably be round-nosed. The part of the spring to be bent should be held over a gas jet or spirit lamp until it becomes warm and then pulled into shape with the round-nosed pliers, whilst still in the flame, care being taken to heat only that part of the spring which is being bent, and not to allow the flame to play on the rest of the spring; otherwise much of the temper of the spring will be lost. For this reason the gas jets should be turned low. When the bend is completed the spring, whilst still warm, should be quickly plunged into cold water and then immediately dried with a cloth to prevent rust. By plunging into water as previously stated, the energy of the spring is revived.

Holes of various sizes can be quickly and easily punched in the spring by laying the latter on a lead stake, or a piece of hard wood held in the vice with the end grain uppermost. A solid centre-punch is then held over the place where it is desired to pierce a hole, and smartly driven into the spring. The spring is then turned over and the burr which has been raised filed flat, the hole afterwards being opened out with a file. The filing will be better accomplished if the spring is held in the vice as near as possible to the hole. An alternative method for making the holes is by holding the spring over a hole in a steel plate or a bolt nut, and then using a centre-punch to drive the hole; or the tool as shown in Fig. A can be used. This tool can be bought from a dealer in clockmakers' tools or can be bent up out of a flat piece of mild steel into the form of the letter "U." Two holes are then drilled opposite one another in the free ends, a steel peg being inserted in one hole and riveted tight. The tool is used by holding the open ends loosely between the jaws of a vice, inserting the spring, and the vice screwed up until the steel peg forces its way through the spring and into the opposite hole. This form of punch makes a clean round hole and can often be used without the need of softening the steel spring.

Fig. B shows tool clips which are useful for holding various tools by their handles, the spring being bent as shown and pierced with a hole for the insertion of a wood screw to hold it in a suitable place on the wall near the bench. The ends are curved to facilitate easy insertion of the handles. The type of spring shown in Fig. C is useful for curing a window from rattling, and is held in place on the window frame by the sharp claws at the ends. These ends are cut with metalworkers' shears.

A broken lock spring can easily be replaced by forming the spring shown in Fig. D. It is advisable to use as thick a spring as possible or to employ duplicate springs, one within the other, to give the required force to return the handle. Fig. E is a form of spring which can be used in a flashlamp to prevent play between the battery and case and ensures good contact being made by the terminals. The spring presses against the side and base of the battery simultaneously. Fig. F is a return spring attached to a pair of snips or shears, which facilitates their use and prevents sore fingers from the continual opening with the backs of the fingers as is otherwise necessary.

Figs. G and H show uses of the ever-handy clock spring on the motor cycle, Fig. H being an emergency cap for the carburettor, made from a suitable-sized tin lid with a length of spring coiled and riveted inside to hold the cap firmly in place.



Some Uses for Old Clock Springs.

The above examples are but a few of the many uses that can be made of old clock springs, and the handyman will have no difficulty in conceiving other forms and applications to suit his own requirements, whether it be in the home, workshop, or garage.

CLOCKS, RENOVATION OF

In many cases of clock stoppages and breakdowns there may be very little the matter with them, and in almost every case they can be made right without too much trouble or cost.

Clocks are often fitted in wood cases, which in time need some repairing and renovating; especially grandfather clocks. This work has to be done by the expert renovating cabinet-maker; and it may be difficult to get the movements, that is, the works, of the clocks properly done by professional clock makers, until it becomes necessary to do the work personally.

A Grandfather Clock Restored.—An instance is the case of a grandfather clock restored.

Upon critical examination it was found that the points of the escape wheel were curled up, and had to be stoned down and filed up true. The faces of the pallets were worn hollow and had to be carefully ground to shape. Some of the wheels were loose, and pivots had too much play in the plate holes, in particular those of the winding drums, due to the pull down of the heavy driving weights and neglect in oiling the working parts. There were other faults too, which any mind of practical intelligence could see must be made right; which was done by medium ability ordinary tools, and no cost worth mentioning.

It always gives considerable satisfaction to see a grandfather clock restored to usefulness and beauty; to have a handsome, reliable time-keeper in the house. And then it was asked could anything be done with several other clocks in the various rooms.

French Mantel Clocks.—Amongst these were the three attractive mantel clocks shown in the Plate facing this page, all of which were not working and somewhat shabby, but are now keeping good time and striking regularly. When clocks are on strike they do not strike at all. But the work of doing all these three clocks was nothing in comparison to the one grandfather clock. In fact, apart from the time of cleaning, renovating, and putting in order, there was practically no cost except a few pence for new keys. It was done by a cabinet-maker and repairer, not a clock maker or mender, on the distinct understanding that "we are furniture makers," no profession being made to be clock menders.

A clever home handy worker should be able to do all that was necessary to these clocks; thereby saving a total cost of £2, which was paid for the three; or earning that amount by doing them for someone else. Each clock is worth much more than that figure.

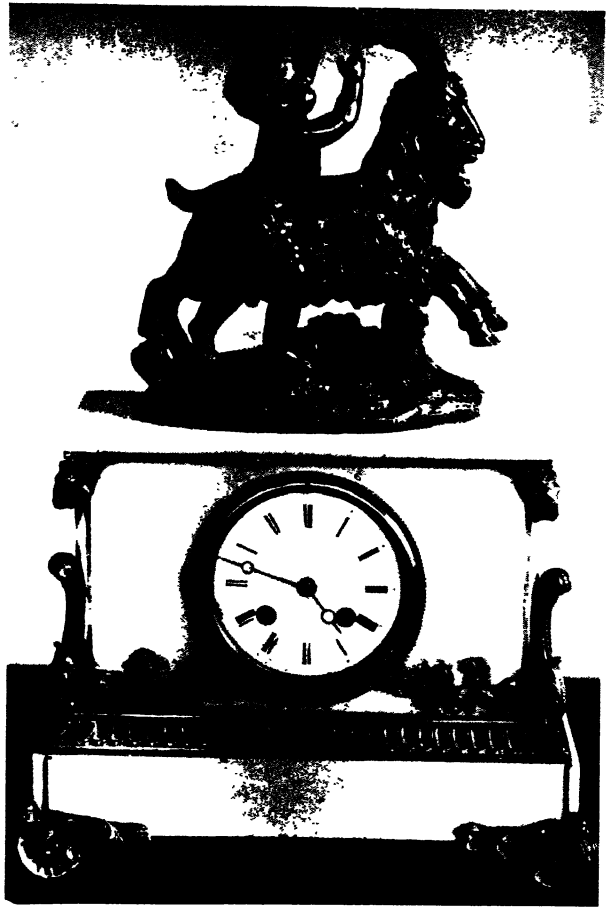
Mantel Clock in Marble and Bronze.—A (Plate facing this page) is a good French movement in a white marble case with bronze ornamental work. The movement was taken from the case, and examination proved there was no part missing or broken, but it needed cleaning, oiling, and adjusting. It was not necessary to take the movement to pieces, as it could be sufficiently cleaned by brushing out with fine artist's brushes; first dry, then by dipping in pure paraffin oil; leaving in a suitable position to drain, then again brushing out with dry clean brushes and wiping with a bit of soft rag. Then all pivot holes were given a very slight touch of clock oil applied from the end of a piece of thin wire.

On winding up the going and striking barrels through the holes in the enamelled dial, the movement was set in motion in good order, except that the bell and hammer needed adjusting to get the right sound of strike; which was done by carefully bending the hammer arm.

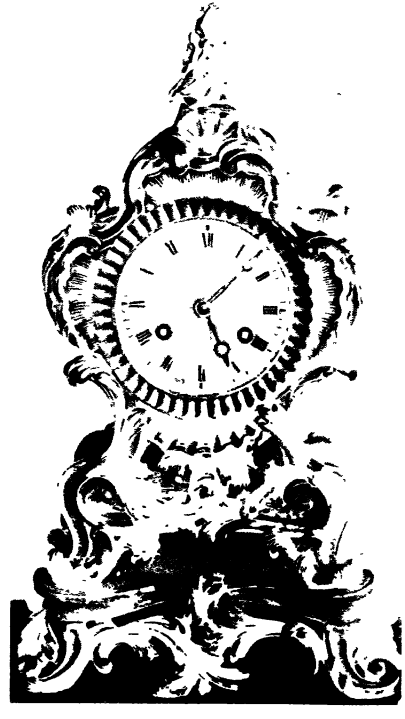
The marble and bronze were simply washed carefully with warm water and a little soap, finished with pure water; and dried by plenty of vigorous rubbing with a clean cloth and brush. A corner of the marble top was broken off and missing. The broken edge had to be filed straight, and a new bit of marble was cut from a piece of slab, carefully filed to the exact shape, and fixed on with Croid glue.

The clock movement was then fixed in the case quite true and the pendulum hooked on, and has now been keeping excellent time for several months. With fair usage it will give good service for many years.

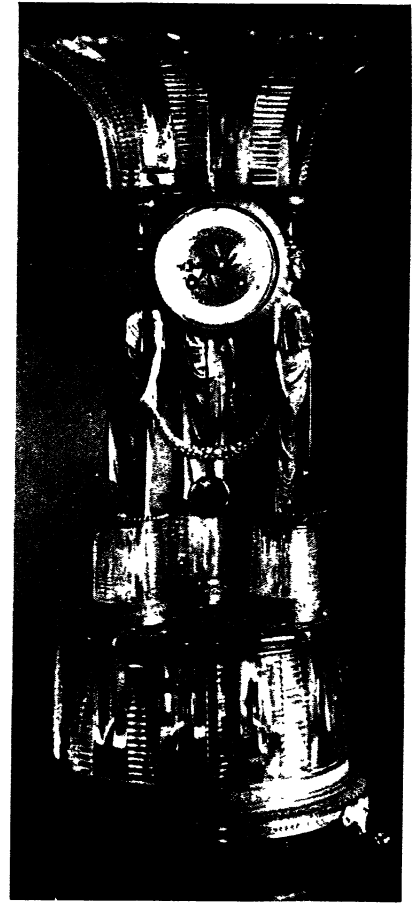
A French Clock in Porcelain.—B (Plate facing this page) is another French clock movement set in porcelain, of Louis design; complete in itself, but further elaborated by being set on a separate-made base to the same design; the whole being on a wood stand with moulded, ebonised, polished



A.—A French Mantel Clock in Marble and Bronze



B.—A French Clock in Porcelain



C.—A Clock in Cut Glass and Ormolu.

CLOCK RENOVATING.

edges and four small bun feet. The top surface is covered with velvet, and is grooved to fit a large glass shade (which was left off to take the photograph). The shade would keep the clock clean indefinitely; but some time it must have been without one, as it needed similar treatment to the other clock. But it did not stand plumb and level on the mantelpiece.

To correct this, some pieces of thin leather were cut the size of a shilling, to be placed under the feet as required to get it right and true by testing with a small spirit level. When it is correct the tick should be quite regular; and the leathers can be fixed with glue.

A Clock in Cut Glass and Ormolu.—C (Plate facing page 270) is an elaborate old-style drawing-room clock. This, too, is a French movement in a setting of French design and make.

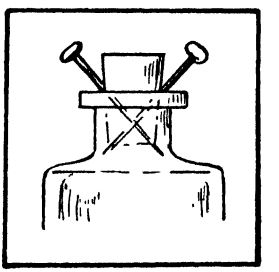
It is constructed of many parts in cut glass and brasswork, bolted together; and was also on a wood stand covered by a glass shade. Some time it had met with an accident, breaking the shade and the cut glass bowl at the top, and somewhat deranging the whole structure, enough to set it out of true; so the clock would not go; but the movement was not damaged.

The whole setting had to be taken apart to clean each piece and reset it up true, the broken pieces of glasswork being joined with clear French glue. All three clocks were regulated to keep exact time when in their respective positions; by moving the pendulums the slightest degree higher for faster, lower for slower.

CORK, TO SECURE IN BOTTLE

A cork fitting badly in a short-necked bottle can be secured tightly in the following manner :

Stick two pins with as large heads as possible crosswise through the cork. This is a simple and secure contrivance, which prevents the cork from getting loose. In order to withdraw the cork, the pins must be removed first.



Novel Method of Securing Cork in Bottle.

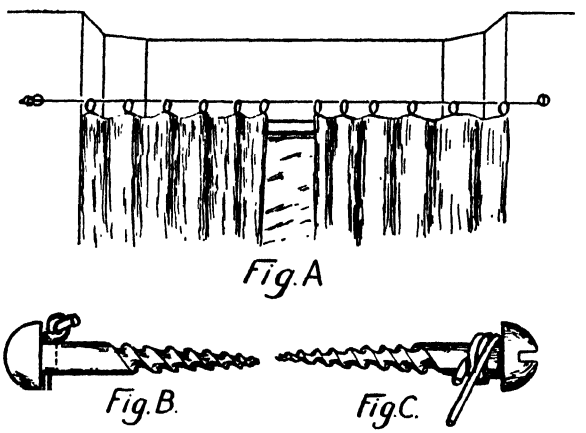
CRACKS IN DOMESTIC FITTINGS

Cracks in lavatory basins, baths, sinks, between window frames and their walls, door frames, skylights and similar examples can effectively be filled, with permanent results, with a proprietary make of sealing compound. It is usually thick pasty material and is applied with a trowel, old kitchen knife or palette knife into the cracks until these have been completely filled. When dry it sets hard and acts as a strong seal and joint between the material on either side of the crack.

It is important to ensure that the surfaces are quite clean and ree from oil or grease. The compound should be pressed well into the oints.

CURTAIN HANGING

A neat and strong method of hanging curtains is shown in the sketch It is specially suitable for curtains that are in use, such as those covering the box or bay windows in sitting-rooms. Usually the curtains are hung on wood or metal rings, which slide on a wood or metal rod. These rings can be retained, but the rod is replaced by means of a stretched wire. A hole is drilled in the wall at a suitable height on each side of the window, and fitted with a wood plug. In each of these a No. 20 round-headed screw is fitted. These screws are about $\frac{5}{16}$ in. diameter. In one of these a hole is drilled, as shown in Fig. B. The other, Fig. C, has the slit in the head deepened. A length of steel piano wire has a knot made on one end. This end is placed in the slit in the wood screw, and the other end passed through the hole in the other screw, and enough slack allowed to enable it to go round the screw three times before it is rung up tight. This is accomplished by turning the right-hand screw. It will be seen that the screw should extend sufficiently from the plug to enable these three turns to be taken. When finished and the right length found, the wire should be slacked back by unscrewing the screw, after which the wire can be taken from the slit in the opposite screw. All that is necessary now is to slip on the rings, replace the wire in the slit, and tighten up.



Neat and Inexpensive Method of Hanging Curtains.

DOOR KNOBS, TO REPAIR, SECURE, ETC.

The knobs, or handles, used for doors vary in design and method of attachment to the door. Most of them are in conjunction with locks and have to turn or slide for operating the catch of the lock. Others are simple fixtures used as a convenient means of pulling or pushing, and at the same time holding the door under control in either direction. Knobs used for drawers are of this class. The first are generally of brass; the second of wood, though other substances, such as china, glass, copper, iron, are often used for either.

A common type of handle in connection with a lock is shown in Fig. A. The knobs fit on the ends of a square spindle or shank and are held by screws at a distance apart which suits the thickness of the door. By removing the screw from the neck of one of the knobs it can be slipped off, leaving the other knob and the spindle free to be drawn out bodily

from the other side of the door. In replacing the handles it will be seen that provision is made for endlong adjustment by having a series of screw holes through the square spindle, and the screw in the knob enters the one which comes nearest for distance. Washers or plates, not shown, are generally used between the knobs and their bearing against the door.

These knobs should be adjusted on the spindle so that there is no slackness endways between them and the door. If the positions of the

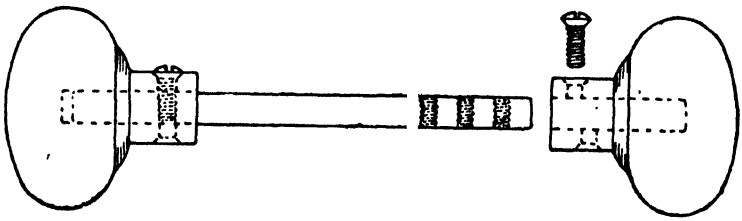


Fig. A.—Adjustable Knobs to suit Door Thickness.

screw holes in the spindle do not permit of this, it is best to use extra washers between the shoulder of the knob and the door. If these washers are not larger in diameter than the shoulder of the knob, they will not be very noticeable, and it is better to have them than the annoyance of slack handles. Small iron washers to make up the thickness, or leather or rubber washers, can be used.

The loss of a screw from one of the knobs leaves both free to be pulled completely away from the door, and a new screw must be obtained. An ordinary wood screw is not suitable, though we sometimes see it used. It serves the purpose of keeping the handle on, but the head of the screw stands out some distance from the neck of the handle, instead of being flush, and, as the thread of the screw does not fit, it holds unreliably in the one part where it can be pinched into tight contact. It is better to take the handle to an ironmonger and get a screw to fit.

Screws that are loose or insufficiently tightened sometimes work back and fall out and get lost. A precaution against this is to insert screws from the upper side of the handle rather than the lower.

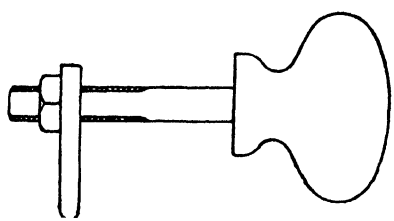


Fig. B.—A Cupboard Turn.

Knobs used for cupboard doors, Fig. B, may have a catch or button on the inside of the door, which fastens by a turn of the knob. This also is generally made with a square spindle to ensure the catch turning with the knob. The corners of the square spindle are generally threaded, as seen, so that the catch can be screwed on to the correct distance to suit the thickness of the door. It is then

kept there by screwing a nut on into contact with it. Readjustment of this is sometimes necessary to obtain correct working of the button.

The same principle is embodied in some other knobs which do not operate a catch, a plain washer being used with a nut outside it. The

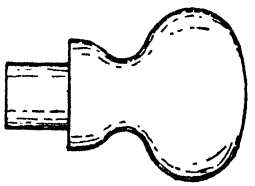


Fig. C.—A Wooden Knob with Stud for fitting into Bored Hole.

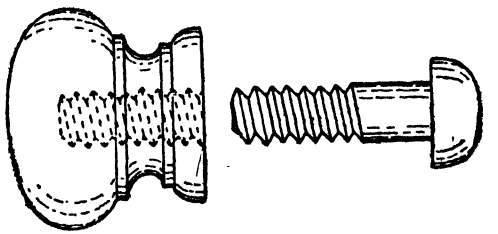


Fig. D.—A Knob and Wooden Pin which screw together, the Pin fitting a Hole through the Door.

knob in this way is secured as a non-turning fixture to the door when the nut is screwed tight.

A plain wooden knob with a stud for fitting into a bored hole is shown in Fig. C. These are used for small drawers and other purposes. Generally they are glued in, but are sometimes merely a tight fit. The stud should be of a diameter to suit a certain size of centre-bit. If it is a little too slack, paper may be glued around the stud or in the hole; if too tight, the stud may be reduced slightly.

Another type of wooden knob commonly used, Fig. D, has a threaded hole with a wooden pin threaded to suit, the pin having a knob at the outer end. To fit this a hole the same diameter as the pin is bored

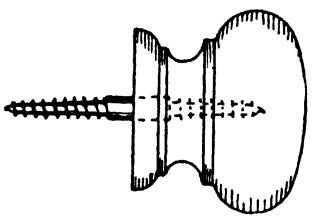


Fig. E.—A Wooden Knob fitted with a Metal Screw.

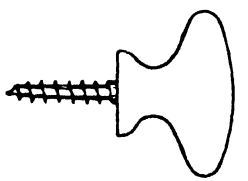


Fig. F.—A Metal Knob with a Screw.

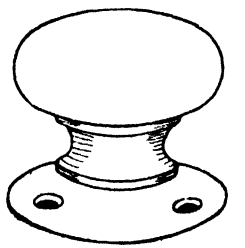


Fig. G.—A Metal Knob with Screw Holes.

through the door or drawer front, and the pin inserted with its knob bearing against the inner surface. The handle is then screwed on to the projecting end of the pin until it is tight. Glue may or may not be used with this.

A large number of wooden knobs are provided with double-ended metal screws, Fig. E, and are attached by screwing them into a small hole

bored with bradawl or gimlet in the wood, the tightening of the knob tightening the screw in opposite directions. Metal knobs, Fig. F, are also provided with screws solid with them, so that the knobs are easily attached and secured by turning them in the direction of the hands of a clock, and removed by turning them the reverse way.

Fig. G shows a metal knob with screw holes for attachment to a wood surface. They generally have three holes, and are used where a knob is wanted independently of a lock. A plain wooden knob with no stud or screw can be attached by putting a screw through the door into the knob, as in Fig. H, but this is not often done.

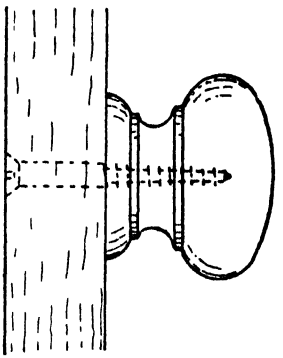
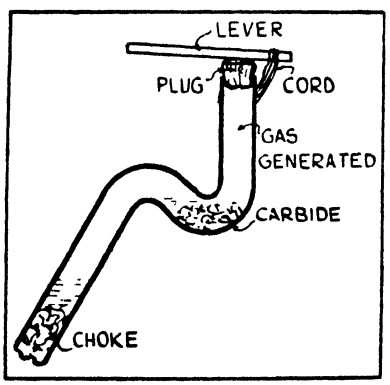


Fig. H.—Wooden Knob secured to Door by Wood Screw.

Wooden knobs are turned in a lathe and can be bought cheaply at a woodturner's shop or any place where prepared wood and small wooden articles are sold. Metal knobs are sold by ironmongers.

DRAIN PIPES, TO CLEAR

Choked drains may easily be cleared without the use of rods or pumps by the following method, which is applicable to straight pipes or pipes with acute bends:



Method of Clearing Choked Drain Pipe.

Obtain some calcium carbide such as is used for gas lamps, and insert about two tablespoonfuls in the end of the choked pipe. Add a cupful of water, and immediately plug the end of the pipe with a tight plug of wet cloth or rags. The plug can be levered into place with a length of stick or by any other suitable method. The gas generated produces a tremendous pressure and forces out any obstruction in the pipe.

The illustration shows the method as applied to a choked waste pipe from a sink or wash-hand basin.

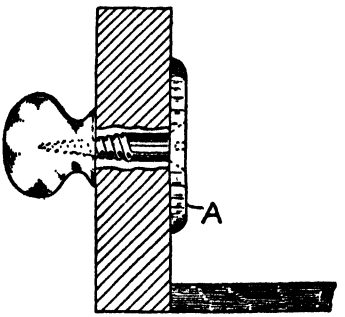
Note that acetylene gas is very inflammable and no open flame should be used while cleaning drains by this method.

DRAWER KNOB, REFIXING

Trouble is often experienced with loose drawer knobs. These may readily be refixed in the following manner:

If the knobs are of the wooden screwed type and the hole in the drawer has become worn, the screwed end of the knob is cut completely off.

Cut the disk (shown at A), from strong wood, such as oak, about ¼ in. to ⅜ in. thick.



A Neat Drawer-knob Repair.

Make a hole in the centre of the disk and countersink the face to take the head of a countersunk-head screw. A hole is drilled about half-way through the centre of the knob, and screwed in place as indicated by the illustration. A little glue should be smeared on the face of the disk A, which will permanently set it in position.

DRAWERS, TO PREVENT STICKING

The drawer should first be emptied of its contents and slid out for inspection. If there are signs of dampness, the expansion of the wood due to this is no doubt the cause of the drawer sticking in its guides. Careful drying will usually remedy the trouble, but it is necessary to wax all the sliding surfaces, before putting the drawer back again. Ordinary candle (paraffin) wax is excellent; other alternatives are yellow soap, thick motor grease or tallow. Rub the wax well into the pores of the wood and treat the drawer guides in the same manner, before replacing the drawer. Once eased in this manner a drawer should give no trouble for many years of use.

If the drawer slides are dry, but exhibit tightness, the only remedy is to plane off the bearing surfaces which show a polished appearance—due to excessive friction. Always wax or otherwise lubricate the sliding and guide surfaces before replacing the drawer. If a chest of drawers is not level the drawers may tend to stick; the obvious remedy is to pack up the legs which are lowest, with a wedge or similar packing.

Another preventive of sticking of a drawer due to absorption of moisture is raw linseed oil. This should be rubbed hot into the wood, thoroughly. It will waterproof the wood and greatly reduce the friction.

Metal-edge drawers are best lubricated with graphite grease, for when the grease disappears graphite remains as a permanent lubricant.

DRY ROT, REMEDY FOR

Petroleum is an enemy of dry rot. Brush it over the affected parts, and the fungi will soon oblige by drying and dropping off. One could say that they go into mourning for it, because they turn black.

ENAMEL UTENSILS, TO RENOVATE

The following method can be used to repair enamel utensils or galvanised baths, even though they may have deteriorated to such an extent that the tinsmith will tell you that they cannot be repaired.

First take a piece of clay and make it quite plastic, taking care that it is free from moisture. Now clean the article round the hole to be

repaired, making sure that it is free from rust, etc. It is essential that all enamel or galvanised deposit is scraped away and the metal made as bright as possible. Take the clay and make a small dent in it, rather larger than the hole, and in the shape of a small bolt head. Smear both sides of the hole with ordinary flux. Place the clay on the article with the dint over the hole, and melt the solder into the hole until a small knob or lump is formed inside. When cool, the job is finished. For flux use spirit of salts.

FILES, TO CLEAN

Clogged or greasy files can be cleansed as follows, namely, (1):

For files clogged with metal filings, use a wire brush or file card. Alternatively, cut a strip of tin or thin sheet brass and place edge on to the surface of the file. Press and move in the direction of the file cuts, when a series of teeth will be formed on the strip. With this serrated edge the rest of the file can soon be cleaned of filings.

(2) For files clogged with aluminium cuttings, dip into hot caustic or washing soda solution for 5 to 10 min., when the cuttings will dissolve sufficiently to brush off.

FILES, WORN, TO RESTORE

Worn files can be restored so as to give a further useful cutting life by placing them in fairly strong acid solutions and thus allowing the acid to dissolve some of the "blunt" metal of the teeth until they become sharp again.

Use a porcelain dish and place the degreased files flat in either of the following solutions :

(1) Sulphuric acid, 100 vols.; nitric acid, 150 vols.; water, 800 vols.

(2) Sulphuric acid, 1 vol.; water, 4 vols. Add the acid slowly to the water, stirring all the time with a glass rod.

After immersion for 5 to 30 min., with occasional examination, remove from the acid solution, rub over the teeth with a cork to wipe off acid from the tops of the teeth and allow the remaining acid to act on the root portions for a further 15 mins. or so. Then wash thoroughly in plenty of water.

FIRE EXTINGUISHERS

The principle of the liquid or gaseous extinguishers is that of producing an inert gas or vapour over the burning article so that there will be no oxygen available from the surrounding atmosphere to continue the combustion.

The liquid mostly used in chemical fire extinguishers is carbon tetrachloride; this liquid is readily evaporated and, incidentally, is used for cloth and fabric cleaning purposes as it is a powerful solvent of oils and greases.

The gas mostly used is carbon dioxide. Sometimes the compressed carbon dioxide is contained in steel bottles and injected at a low pressure with correspondingly large volume through a nozzle. In other cases the

container has a supply of sodium bicarbonate and dilute sulphuric acid. These are normally kept apart, but when the knob of the extinguisher is struck the sealed glass bottle of acid is broken and its contents quickly reach the powdered bicarbonate and generate carbon dioxide gas under sufficient pressure to be ejected through the nozzle on to the fire. A typical fire-extinguishing liquid can be made up by mixing 4 parts of ordinary salt (sodium chloride), 2 parts of ammonium chloride, and 1 to 1½ parts of water together.

Another satisfactory liquid consists of 3 lb. of calcium chloride, 1 lb. of sodium chloride, and 2 gallons of water.

FIRE-EXTINGUISHING HINTS

Small fires in the open can be extinguished by throwing plenty of sand or earth on to them, so as to smother the combustion.

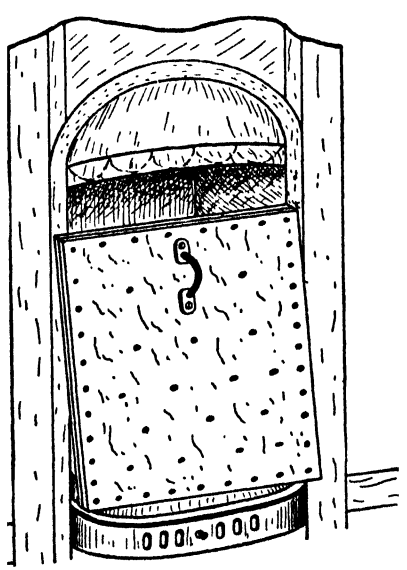
Small fires, such as those of *articles of clothing*, in the house, can usually be extinguished by wrapping a large cloth or blanket around them. This method has saved many people from dangerous burns.

A *workshop fire extinguisher* consists of 10 lb. of sodium bicarbonate and one bushel of sawdust (or sand). This gives off carbon dioxide gas. A bucket of sand should be kept in the workshop or garage for fire-extinguishing purposes, where no proper extinguisher is available.

FIRE EXTINGUISHING IN CHIMNEYS

To extinguish a fire which has caught the soot in the chimney alight, sprinkle the fire in the grate liberally with common salt.

The fire in a chimney may be extinguished by sprinkling several ounces of powdered sulphur on a shovel and holding the latter over the fire so that the sulphur dioxide fumes escape up the chimney and thus produce an inert atmosphere which stops the soot from burning further.



Asbestos Sheet Fire-draught Producer.

FIRE LIGHTING MADE EASY

Difficulty is often experienced when lighting a fire in slow-burning grates of the low-down well type. A sheet of newspaper is generally held before the fire for a few minutes. This often has the desired effect, but there is always the danger of the paper catching fire, and holding it is tedious.

Instead of newspaper, try the following arrangement. Obtain a sheet of asbestos which will three parts cover the fire opening, also a sheet of three-ply

wood of same size. Fix the asbestos on to the three-ply by means of small flat-headed tacks. Obtain a small staple eye from the ironmonger's and screw this on to the three-ply near the top.

This handy little contrivance is placed in position as indicated by the accompanying illustration, and is easily handled by means of the staple eye.

FIRELIGHTERS

A very simple and cheap firelighter can be made by folding sheets of newspapers into thick sections, resembling strips and tying each of these into knots. A series of such "knots," each sprinkled sparingly with paraffin oil, should be placed in the grate and pieces of coal piled on top. Domestic boilers can readily be lighted with thick twisted lengths of newspaper.

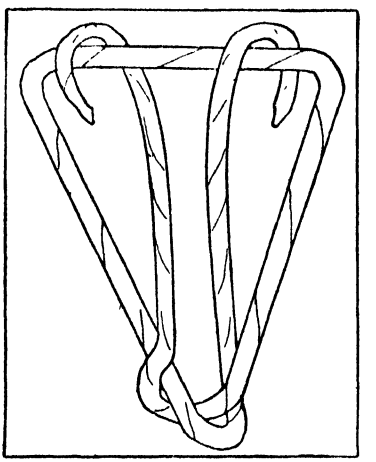
The domestic firelighters purchased from shops consist of wood strips, shavings or sawdust impregnated with naphthalene (crude) and resin. The naphthalene—which can be obtained from the gasworks—is gently melted and poured over the wood material in sufficient quantity just to saturate it. The resin is then melted and sprinkled over the surface.

Creosote oil can be used to saturate wooden chips for fire-lighting purposes.

A good firelighter can be made up from 3 parts, by volume, of sawdust; 3 parts of naphthalene and 5 parts of resin. The sawdust is first soaked in the melted naphthalene and then the melted resin is poured over it. After setting, the mixture can be chopped up into suitable sizes found by previous experiment to be satisfactory for lighting an average fire. Thick paper twisted into short rolls and then soaked in naphthalene also makes a satisfactory firelighter.

FIRELIGHTERS, NEWSPAPER

Roll sheets of newspaper into long cylindrical shapes, and when the roll is finished from a triangle as shown in sketch. If one loose sheet is put into bottom of grate and three triangular roll pieces are put in to from a pyramid, with coals packed round, no sticks are required, and fire will burn up quite briskly.



Illustrating Use for Old Newspaper.

FLIES, GETTING RID OF

When painting proceeds in the summer it frequently happens that small flies, gnats, etc., become stuck and spoil the work. To prevent this a little camphor oil (say, 1 pint to the gallon) should be added to

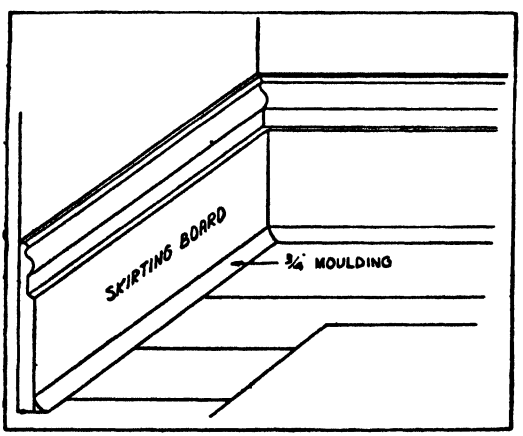
the turpentine. This will not interfere with the drying properties of the paint, but the odour will effectually drive the insects away. The addition of ½ pint cedar oil to the gallon of paint will have the same effect.

The Women's Imperial Health Association, Ltd., of London, some time since issued a pamphlet in which they gave the following useful hints for getting rid of flies :

"Flies may be driven out of a room by : (1) burning feathers; (2) burning a tablespoonful of pyrethrum powder (Persian insect powder); (3) sprinkling three or four drops of oil of lavender on a sponge lightly squeezed out of very hot water and placed in a saucer in the windows; (4) by heating (e.g. on a hot shovel) a tablespoonful of cresol till it vaporises; (5) by spraying rooms and round windows with formalin (purchasable from any chemist—a teaspoonful to half a pint of water); (6) by sprinkling oil of eucalyptus on walls, tables, etc.; (7) by wiping windowsills and sashes with a cloth moistened with paraffin. The following fly baits for traps are recommended : (1) 1 spoonful of casein (penny boxes at chemists'), 1 spoonful of brown sugar; mix to a paste with water or beer and add a little banana or strong-smelling fruit; (2) vinegar with sugar and a little bread; (3) milk and water and formaldehyde; 6 tablespoonsful of milk, 6 tablespoonsful of water, 1 tablespoonful of formaldehyde; place in saucers with a little bread, with jam on in the centre; (4) fresh beer and sugar; (5) fruit syrup or fresh jam; (6) meat or cheese and bread soaked—for blow-flies.

FLOORING, ELIMINATING CORNERS

In these days, when hygiene is so widely taught and the clearing out of dust so much advocated, anything that will ease the housewife's task is well worth consideration.



Method of Eliminating Corners in Rooms.

The junction of the skirting board and floor is a favourite place for dust to accumulate, and the simple expedient of filling the corner in with a piece of wood moulding lessens the time taken to clean the surround by at least 50 per cent. The moulding selected should be about ¾ in., which is pliable enough to fit snugly, should there be any uneven parts of the floor. It can be bevelled at the right-angled corners of the room and fixed with thin wire nails. It is advisable to drill the holes through the moulding for fixing it in position, and if painted the same colour as the skirting looks quite neat in appearance.

FLOORS, CONCRETE, TO MAKE DUSTPROOF

The ordinary concrete floor is apt to become dusty and untidy in the course of time, due to small particles of cement and other ingredients crumbling off. It is not a difficult matter to make such floors dustproof in the following manner :

Make up a solution consisting of 1 part of waterglass (of syrup-like consistency) and add from 4 to 5 parts of water. Sprinkle this solution on the floor, using a short hair broom to spread it evenly over the surface. It is generally necessary to apply a second coat of rather stronger consistency (1 part waterglass to 3 parts water) to the floor after the first coat has dried. The final surface is a semi-smooth one, composed of dried waterglass and embedded dust particles; the waterglass effectively fills the pores of the concrete and prevents any further crumbling. This surface is waterproof and can be painted in any colour for artistic or other purposes.

FLOORS, FILLING HOLES AND CRACKS IN

Open joints in floors are often very troublesome to deal with. If the joints are very wide the best method to follow is to drive in thin pieces of wood, on which has to be applied glue on each side, then to plane off the surface to a level. If, however, they are of less magnitude, it is advisable to use instead a paste or composition, particularly when the open joints are irregular. For this purpose the following method may be used. Take any paper—ordinary newspaper will answer—tear it in small pieces, boil it, afterwards manipulate it in such a way as to reduce it to a pulp. Add to this about half the bulk of plaster-of-paris with a little colouring matter, such as ochre, to approximate the colour of the floor boards. Finally add whiting and Japan driers so as to cause the mass to become hard. This is applied like ordinary putty and will be found to be quite effective. Red lead or litharge may be used instead of the gold size, but if the floor is to be stained joints mended in this way may show up in a manner that is not desirable.

Nail Holes.—The rows of holes where the nails fasten the floorboards to the joists are very unsightly. A good filling when staining can be made by melting 1 oz. of beeswax in a tin and, while liquid, stirring in a teaspoonful of turpentine and sufficient of the staining powder to make the stopping the desired tone. Apply with a putty knife, rub with a duster, and then polish in the usual manner. Plastic wood or putty can be used for smoothing off nail holes where the timber is to be painted afterwards.

FLOORS, PAINT AND GREASE STAINS ON

Paint can be removed from floors as well as grease by using an alkali paint remover, made by mixing 1 lb. of ordinary washing soda and 1 lb. of quicklime with 1 gallon of boiling water. This has a bleaching effect

upon the wood and successfully removes both grease and paint. In the case of the latter, it should be allowed to remain on 15 minutes so as to soften the paint. Grease, however, will be removed immediately by using the above solution and scrubbing the floor with it.

FROST PROTECTION OF WATER TANKS

A typical example of protection of the water tank in the roof against freezing is shown in the Plate opposite.

The size of the compartment having been decided upon, the portion of the roof immediately under the tiles at A was covered with large sheets of medium-substance strawboard obtained from a local picture dealer and framer. The cardboard was fixed with short flat-headed nails.

A rough framework was made with uprights by their lower ends to the ceiling joists and by their upper ends to the roof rafters. These were also covered with sheets of strawboard B, except a large opening for ready access to the tank. This is very important in case of an overflow, say.

The tank also had a removable cover which had to pass through the opening. Finally the opening was covered with a large easily removable piece of plywood cut where necessary to clear a pipe. The piece of plywood is not shown in the photograph.

At C can be seen the cowl of the geyser, the vent pipe of which projects through the ceiling.

Finally the spaces between the tiles and the cardboard under the roof were filled with loose balls of newspaper pushed down with a stick. Any other gaps between the ceiling joists were also treated in this way. The whole contrivance is very rough-and-ready and costs but a few shillings, but it has proved very efficient and successfully kept frost out of the water system in the loft during a very cold spell of weather when every other house in the block was frozen up solid.

In extreme weather the pipes in the bathroom are protected by burning an electric radiator lamp as used for garages. This serves the dual purpose of keeping the bathroom warm and also supplies the compartment in the loft with heat through the ceiling of the bathroom and the vent pipe of the geyser.

FROSTING GLASS WITH GLUE

When glue or gelatine is allowed to dry out rapidly upon a sheet of ordinary window glass, it tears away the surface of the latter and shapes it into characteristic fern-like patterns. The general appearance of this frosting can be modified by varying the strength of the glue and by the addition of certain chemical salts, such as alum. The quality of the glass also enters into consideration. Brittle glues, however, give quite a different pattern from tough glues, and some idea of their possibilities should be obtained by carrying out a few experiments. Strong solutions of

ILLUSTRATING METHOD OF PROTECTING ROOF TANK AGAINST FROST EFFECTS.

gelatine, containing 6 per cent. of alum, give excellent results, and when applied to the surface of the glass after superimposing a simple stencil some exceptionally fine effects are to be obtained.

Another Frosting Method.—To obtain a frosted effect on windows, take whiting, two-thirds raw linseed oil, and one-third white japan, mixing to a rather stiff consistency. With turpentine reduce to a condition to work easily under a camel-hair brush. Spread the mixture quickly and evenly on the glass. Then take finely threaded cloth, roll it into a ball, and cover with a clean cotton cloth. Go carefully over the freshly laid-on mixture, softly tapping it until the frosted imitation is brought clearly and attractively into relief. The mixture can be coloured, if desired, before being thinned for application.

Another recipe for getting an imitation ground-glass effect by means of paint. Take white lead, 4 parts; boiled oil, 3 parts; spirit of turpentine, 1 part; add a small quantity of driers. The colour must be exceedingly thin, and put on the panes of glass with a large brush in as even a manner as possible. Dab the paint over lightly with a pad of cotton-wool covered with an old linen rag.

FROZEN WATER PIPES, HOW TO AVOID

To many, especially modern home dwellers, winter means burst pipes, frozen tanks, no water, and other attendant domestic troubles, which might be avoided by a little foresight.

Preparations against Frost.—The first thing is to prevent, as far as possible, freezing of the pipes and tanks. The first step in this direction is to cover all the exposed pipes, the material for which can be purchased at any store, and consists of thick strip felt about 6 in. wide, with sack covering overlapping. First deal with pipes which are most accessible, such as those beneath the sinks, wash basins, etc., the rest of the exposed pipes being found in the loft. The method of wrapping is clearly illustrated by Fig. A.

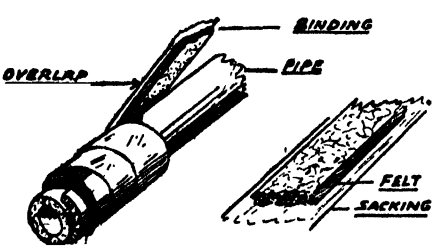
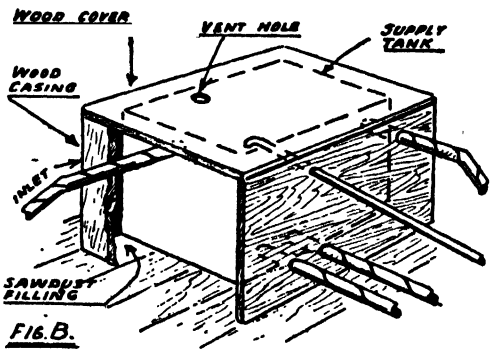


FIG. A.

Method of Wrapping Pipes.

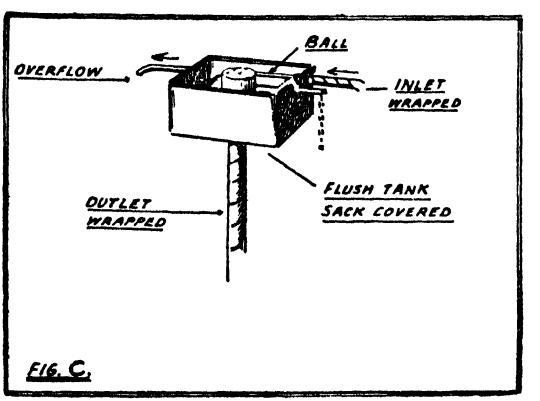
The Supply Tank.—The next source of trouble is the main supply tank, which is usually in the loft. It may be surprising to know that in many cases, on inspection, this tank is more often than not completely uncovered, and that as a result it collects all the dust and dirt which abounds below the roof, and this matter settles at the bottom of the tank, which, if a direct main supply is not used, supplies the drinking water. In any case, the first job is to make a wooden cover for the top,

with one small vent hole drilled in it. Now, to protect the tank, build all round it a wood casing, leaving a 3-in. gap between the inside of the casing and the outside of the tank. The casing is, of course, cut away to clear the inlet and outlet pipes. When this has been done, fill the entire space between the casing and the tank with sawdust, which can be had in quantities from any wood yard. This work will be quite easy for the handyman to undertake, and it may save many pounds in the long run, as when the tank itself freezes it bulges and is liable to "give," not considering the other damage that can be done, and a new tank is an expensive item. The tank covering is illustrated in Fig. B, which will make the details quite clear. I would point our here that keeping lamps, etc., burning in the loft, and other places where pipes are exposed, is of little practical use; and further, fire risks have to be considered.



Covering the Water Supply Tank.

The Flush Tank.—Another source of trouble is the flush tank, which, being situated usually in an exposed part of the house, is prone to freeze. Here, again, the exposed piping should be wrapped as already explained, and the tank itself well covered with sacking (see Fig. C).



Protecting the Flush Tank.

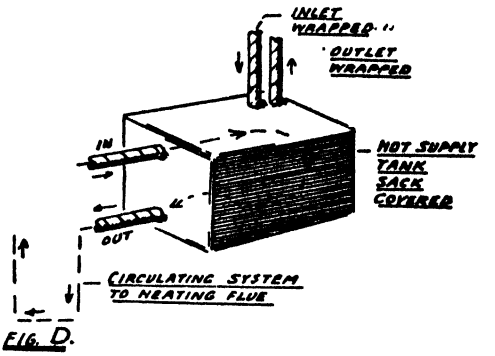
The Hot-water Tank.—The hot-water tank is fed from the main supply tank, and so long as the latter is full, the former is never empty. This should be sack-covered, and the inlet and outlet pipes wrapped, as shown in Fig. D. The tank will be found in some part of the house below the level of the supply tank, and in modern dwellings very often at the bottom of the airing cupboard.

The Supply Tap.—Somewhere outside the front of the house will be found a small iron trap, which when lifted will disclose a tap which cuts off the entire house supply from the main. It is very essential that this trap should always be accessible, but being out of doors, it is liable to rust and get firmly jammed, so that the trap cannot be lifted. The trap should therefore be kept clean and the hinge of the cover periodically greased with vaseline. The tap is usually within reach of the hand, but it should be tested to see if it is easy to turn on or off.

Where the main tap is situated inside the garden wall and not under a pavement plate, it is a good plan to construct a brick surround with drop-on wooden cover, as indicated by Fig. E.

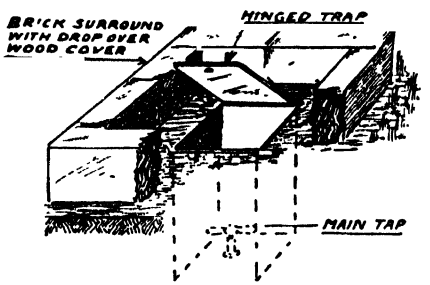
In no circumstances should a tap be left running to avoid freezing, as (apart from water board regulations) the waste pipe may freeze up and allow the running water to flood into the house.

Remedies for Frozen Supply.—If you are already frozen out, it is really better in the long run to turn off the main tap at the outset, and then turn on all the house taps until all the supply tanks and pipes are emptied. This will save trouble when any damage begins to make itself manifest at the subsequent thaw.



Protecting Hot-water Tank.

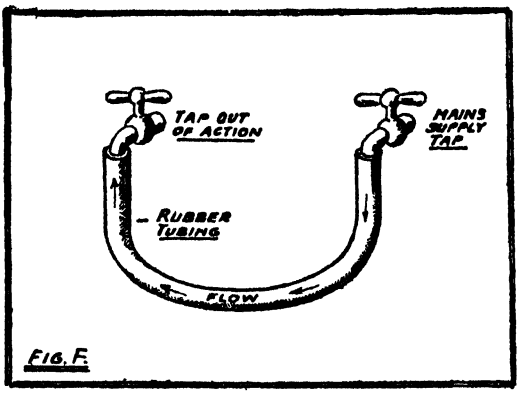
The Hot-water Supply.—Very often, although the supply is frozen, many take no precautions whatever so far as the hot-water supply is concerned. In some houses the hot-water supply tank is fed from the cold-water storage tank, and a circulating system for heating the former is arranged at the back of the grate in the living-room. Often the cold supply is frozen and the hot is not, and this is where the danger comes in. It is dangerous to have the heating flue open, as the hot-water tank should not be allowed to get even warm, because, although this tank is never quite empty, water vapour will be generated. Consequently, where there is a stoppage, something must go—more often than not the tank. Hot water must not be had from this source when any pipes in the house are frozen.



Protecting the Mains Supply Tap.

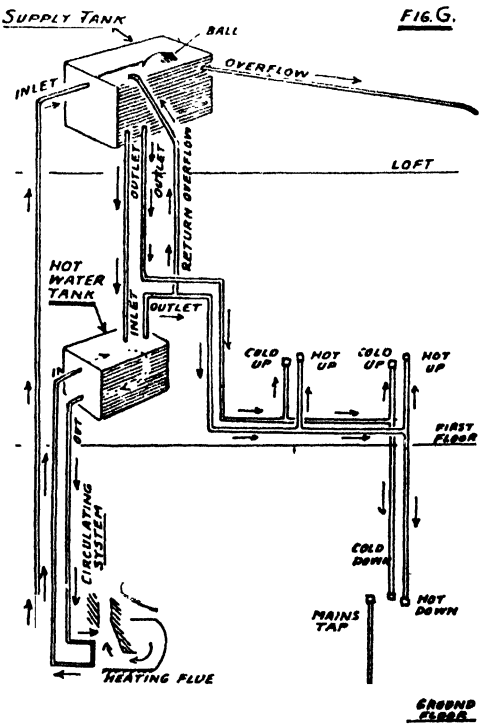
Thawing the Pipes.—Trouble may be saved in the early stages by getting the plumber in right away to thaw the pipes. For this he will use a blow-lamp and start from the store tank at the inlet. When natural thaw sets in, the splits in the pipes will make themselves manifest in a most unpleasant manner, and then you can do nothing other than to have the main tap turned off (this is why it must be easy to get at quickly) and all the house taps on. The leak must be dealt with as best as possible.

Stopped-up Pipes.—After the thaw, you may be the victim of yet another trouble, which usually occurs with the hot-water supply system. This is the stopping-up of the pipes, due to the internal rust and crusting collecting to form a plug, which is difficult to locate. It may be possible to overcome the difficulty by blowing—that is, by air pressure—or you may be informed that the pipes will have to be taken out, and even new ones replaced. Do not agree to this until the pump has been used: but even before doing this try the following simple method yourself. If the water supply is direct from the main, the pressure is much greater than that from the supply tank. If you have a mains tap adjacent to the tap which is stopped, connect a piece of hose-pipe from the former to the latter, which should be already turned full on. Now turn the main tap full on, and hold the piping firmly, letting the water flow from the main, up the other tap. Pressure will be very great, and if you hold the pipe you will feel the force. Also you will hear the water from the main forcing itself through the pipe system where the stoppage is (see Fig. F). Give this a good trial, as it can do no harm (provided you do not try it when the pipes are frozen), and the worst that can happen is that the water will pass to the overflow pipe, which is part of every system. It is a thousand to one that this will clear the system, and when the main tap is turned off, and the piping removed, if all is well, the water will flow from the other tap, and thus a lot of trouble will be saved.



Cleaning a Stopped Pipe.

A Typical Supply System.—This is shown in the illustration (Fig. G), from which it will be seen that the inlet to the store tank in



Typical Domestic Water-supply System.

the upper part of the house is passed from what is termed a ball cock. When this is down, the water is low, the ball floating half submerged on the surface. In this position the water runs in until the ball is up, when the flow is automatically stopped. This prevents overflow, but should the ball device get out of order, any overflow would be taken from the pipe at the top of the tank, running to the outside guttering. From this tank is fed the hot-water tank inlet, return overflow, and outlet; also, from a separate pipe, the house cold-water supply. From the hot-water tank is a circulating pipe, which comes from the bottom, down to the heating system, and up again to the top of the tank, thus generating a constant flow inside the tank as the water is heated. The mains pipe has no tank entry, but comes straight from the main to the tap.

Preventing Frozen Pipes in Roof.—It is a good plan, in very cold weather, to open the trap door into the roof a few inches (as illustrated in Fig. H) in order to allow the warm air from the house to find its way into the roof—since heated air always rises. In very severe weather a safe-pattern oil lamp or small electric radiator should be placed in the roof near the tank or pipes. If the door of the hot linen cupboard is left open the hot air from this will go up through the trap door (previously opened) into the roof.

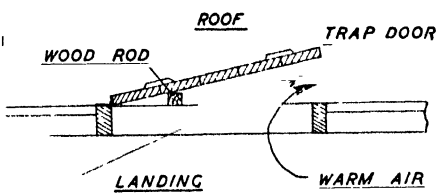


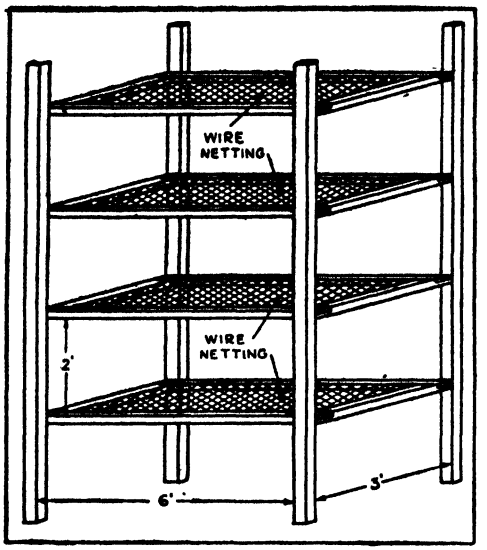
Fig. H.—Preventing Frozen Pipes in Roof.

Frozen Pipes. To Repair Bursts.—After a thaw, it may happen that a frozen pipe bursts or splits. Should this happen, at once shut off the mains supply tap and (if fitted) the roof tank cock. Open all domestic taps to get rid of as much water as possible. In an emergency a wooden plug can be inserted into the roof tank outlet to the house supply. A temporary repair may be made, before the plumber comes, as follows: File the edges of the split and clean the sides of the crack. Dry out the latter and press into it some cold solder, which may be purchased in small lead tubes, e.g. Rawlplugs cold solder. Allow this to cover all round the edges of the crack and to set hard. Then bind the tube with several layers of insulating or black sticky tape as tightly as possible for some inches on either side of the split. If a couple of motorcar hose clips can be obtained, use one on each side of the split.

Another method is to saw off the split portion of the pipe and use a piece of rubber hose with hose clips to connect the existing pipe ends, allowing an overlap of about 1 inch of hose on each end of the pipe.

FRUIT STORING

One of the problems confronting the small owner with an orchard is the limited space available for storing his hard fruit. Usually there is only a small shed, a room, or loft with insufficient area. Many kinds of apple and pear will not stand storing in heaps, and in any case it is



Storage Shelves for Fruit.

difficult to spot the bad ones and to remove these before they have contaminated their neighbours.

A method described here solves the storage problem in a simple and inexpensive manner; it also obviates the use of expensive shelving. Briefly it consists of a main wooden frame made of 2 in. by 2 in. deal, scarfed or half-lapped at the ends so that the pieces lie in one plane. The horizontal frames are then covered on one side with wire netting of about 2 in. mesh, and are fixed at about 2 ft. intervals to vertical members of 2 in. by 2 in. or larger section deal, as shown. The wire netting is covered with several sheets of newspaper before the fruit is placed thereon. The advantage of this arrangement is that one can get at the fruit readily.

FUR IN KETTLES

To prevent or reduce the formation of this calcium salt deposit from hard water, a marble or piece of oyster shell should be kept permanently in the kettle. The constant agitation of this item prevents the formation of deposits on the bottom and lower sides.

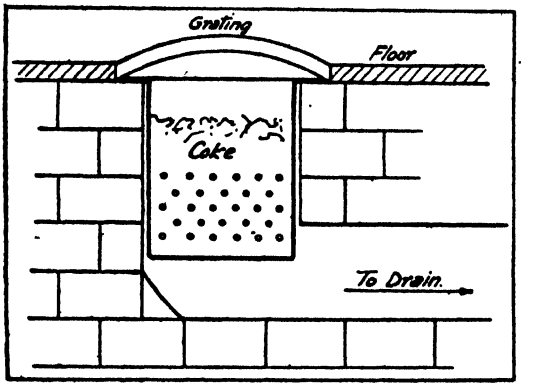
To remove Fur from kettles a flat type of scraper made by grinding the teeth off a flat file should be used. It will be found that the deposit on the sides of the kettle are relatively soft and can readily be scraped away. A wire brush fastened to a piece of stout wire bent to enable the brush to be inserted and operated inside the kettle can also be used. A broad-blade screwdriver is another alternative, but care must be taken when scraping not to injure the metal of the kettle. The deposit on the bottom, inside a kettle, is generally too hard to be chipped or scraped off, and in this case a chemical fur remover such as Epheta will be found effective in removing all of the deposit.

Dilute hydrochloric acid made up from 1 part of strong acid to 3 parts of water is also a good fur remover. The water should be placed in the kettle so as to about one-half fill it and then brought to just below boiling-point. Then, one-quarter of the volume of acid should be added slowly until complete. The kettle should be stood aside for 4 or 5 hours, then emptied and boiled out with clean water.

GARAGE DRAINS, PREVENTING CHOKING

Most car owners are troubled with choked garage drains, due to the mud, etc., being washed off the car when cleaning. A good way of

getting round this trouble is to fit a filter in the drain on the lines of the one shown in the sketch. It is merely a large tin can having a tin lip soldered on to its top edge. A large number of small holes are drilled or punched round the bottom half of the sides, but not in the bottom itself. Into the tin is packed some fairly large pieces of coke, till it is about three-quarters full. This is then placed in the drain and the grating laid over it. In this way, all the sand, etc., is collected on the coke and the drain is kept clear.



A Garage Drain Improvement.

GARAGE FLOOR, TO PREVENT DUST FROM

Concrete floors in garages are liable to become gritty and dusty as the surface layer disintegrates under the heavy wear that most garage floors experience. This dust is apt to get into the working parts of the chassis, to soil the car carpets and generally to become a nuisance. In order to prevent such dusty floors, even when the surfaces are roughened with wear, they should first be swept clean and then given two or three libera coats of waterglass (sodium silicate) made into a thin syrup solution with water. Allow each coat to dry before applying the next. The result will be a dust- and waterproof surface.

GARAGE FLOORS, TO CLEAN

Greasy patches on garage floors usually attract and hold the dirt. To clean such floors first remove all surface deposits with a scraper, e.g. an ordinary garden hoe. Then cover the oily areas with fine ashes and sprinkle with sufficient paraffin oil to moisten same. Rub the mixture well into the surface with an old broom. It will be found that on brushing up the ashes most, if not all, of the grease or oil will have disappeared. For complete cleaning of such floors scrub over with hot washing-soda solution after the above treatment, when the concrete will be left in its new condition.

GLASS BOTTLES, TO CLEAN

Stained bottles used for domestic purposes can readily be cleaned by filling, partially, with hot soda solution and then introducing a small quantity of sand. The bottle should be corked and briskly agitated until all the deposits have been removed. In some instances small pieces of paper in a hot soapy-water solution will remove deposits that cannot be done with the usual bottle brush.

For *more obstinate stains*, e.g. chemical ones, in bottles the following solution usually proves effective, namely : 1 oz., by weight, of bichromate of potash; 2 fl. oz. of strong sulphuric acid and 40 fl. oz. of water. The acid should first be added slowly, whilst stirring, to the water and the bichromate then dissolved.

GLASS STOPPERS

Loosening a Glass Stopper.—Here is a useful hint for loosening a glass stopper which you cannot get out. Tie a piece of string to a door-handle and wind it round the neck of the bottle once. Hold the bottle tightly with the right hand and move it quickly backwards and forwards. The heat causes the neck of the bottle to expand. Hot water poured on the neck of the bottle, or gentle application of local heat from a gas jet, will usually loosen a tight stopper.

Making Stoppers Fit Tightly.—Very often the glass stoppers of bottles which are used for containing various photographic solutions do not fit very well, and thus they may permit of the evaporation or oxidation of the contents of the bottle.

Such stoppers, however, may be made to fit well by means of a little patient grinding. Moisten the stopper with water or turpentine (preferably the latter) and then dust on to it a little finely ground emery or pumice powder. Now work the stopper round and round in the neck of the bottle until the required fit is obtained.

In the majority of instances, a good fit will be obtained after a few moments' grinding in this manner, but in a few bad cases a protracted period of grinding and reapplication of the grinding powder may be necessary.

GLASS WINDOWS, TO CLEAN

Stained, greasy or dirty windows can be cleaned with hot soapy water using a piece of wrung-out chamois leather afterwards to remove any local stains. Hard stains, paint marks or deposits, can at once be removed with the aid of an old safety-razor blade. The latter can be mounted on a simple fitting to hold it at a very acute angle to the plane of the glass.[1] Whiting and methylated spirit applied to glass and then wiped off when the spirit has evaporated leaves a good polish on glass.

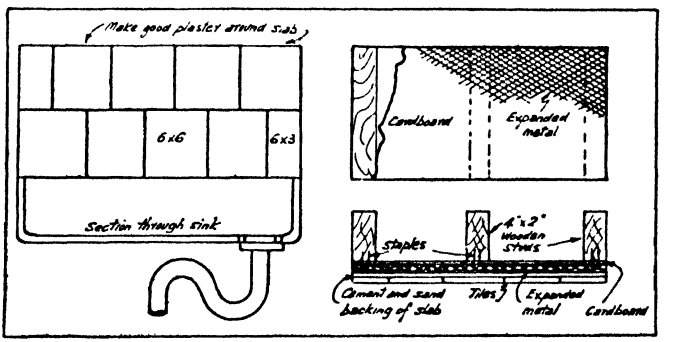
GLAZED TILES, FIXING WHITE TILES AROUND SINKS

First decide what area is to be covered, remembering that white glazed tiles are made mainly in two sizes, 6 in. by 6 in. and 6 in. by 3 in. Make the tiles up into a slab as follows :

Get a stout sheet of brown paper and rule lines to form 6 in. squares. Place the paper on a flat surface and with some hot glue stick the tiles, glazed face downwards, on the paper over the marked square, leaving about $\frac{1}{8}$ in. open joint around each tile. When dry place a bead around

[1] Vide page 289, Volume 3.

the outside edges of the proposed slab ¾ in. or 1 in. (ceiling laths are suitable for this) and nail up same to keep in position. Slightly moisten the back of tiles and then fill in space with 1 part Portland cement and 3 parts clean washed sand, mixed with water to a creamy consistency. When about half the thickness has been floated over the mould, place a few old umbrella ribs across to reinforce and apply the remainder of cement and sand, and screen same off to the level of the top of laths. When the cement is nearly set, scratch the surface over with a nail or something sharp so that a key for fixing can be obtained, and leave same, say, for two days for the slab to harden. When the slab has set, remove the beads or laths and turn slab over, soak the paper well, and clean off.

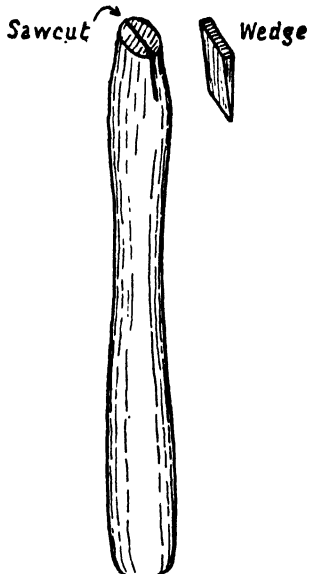


Method of Fixing White Tiles around a Sink.

To fix slab, say, at the back of a sink, where the water has rotted the plaster, also the laths at the back, and the upright studs of the partition are about the only things left, procure some stout cardboard, expanded metal and, say, 1 in. galvanised wire staples. Knock away the plaster to be replaced by the slab. Place the cardboard up against the partition uprights and with a pencil mark a line where the partition studs run down. Place the cardboard against the studs and the expanded metal against the cardboard, and nail both to the studs with the wire staples. (The object is to prevent the cement and sand from falling away and dropping down in the partition.) Work over the surface a mixture of cement and sand as used previously. Whilst this is moist, take the tiled slab, water same, and back up to the cement and sand on wall and prop up with a batten or two until same has set, making sure that the slab is upright or slightly raking back at the top and truly set. In most cases the bottom edge of slab or slabs will rest on the top back edge of sink.

GREASE, TO REMOVE FROM CLOTH

In removing grease with benzine or similar solvents the mistake is usually made of applying the cloth soaked with the solvent direct on the spot. The proper way is to rub round the spot first with solvent, so as to "wet" the cloth round the spot, then rub over the greasy area. When cleaning is carried out the wrong way, the grease is not removed, but merely spread over the material. A piece of clean blotting paper should be placed under the cloth, before applying the grease solvent; this will absorb the dirt and grease.



Hammer Handle and Wedge.

HAMMER HANDLE, TO FIT

The handle is pared down with a chisel suitably for driving into the head and then, before insertion, a saw-cut is made in the end for driving the wedge into, as seen in the accompanying illustration. The cut itself is not made wedge-shaped, or the wedge would fail to spread the end.

The wedge must be the right width and suitably tapered, but any surplus length at the large end can be cut off after it is in. Steel wedges are excellent if they can be obtained, but otherwise a wooden one must be made by cutting with a tenon saw and finishing with a chisel if necessary. Glue is sometimes used to keep the wedge from working loose, but having to force its way in the saw-cut generally keeps the glue from getting in properly. If the taper is correct there should be no trouble, but nothing will keep a wedge in if it is too obtusely tapered.

HANDS, TO CLEAN, AFTER DECORATING

When faced with the problem of regaining a respectable appearance after decorating it should be borne in mind that although turpentine certainly removes paint stains from the hands effectively enough, it is severe on tender skins and often causes a slight rash.

The method of cleaning adopted at an enamel works, which was discovered accidentally, is worth repeating for the benefit of amateur decorators.

Near the washing sink is kept a tin of kerosene (or paraffin). Decorators lather their hands liberally with soap and water and then dip them into the kerosene. After thoroughly working the mixture into the skin, they wipe their hands with a piece of rag, and lightly wash again in soap and water to remove any oily smell.

Every trace of paint disappears, and the emollient property of the kerosene keeps the skin quite soft and smooth. Throughout the winter one has not had the slightest sign of chapped hands.

HANDS, TO CLEAN, AFTER ENGINEERING OPERATIONS

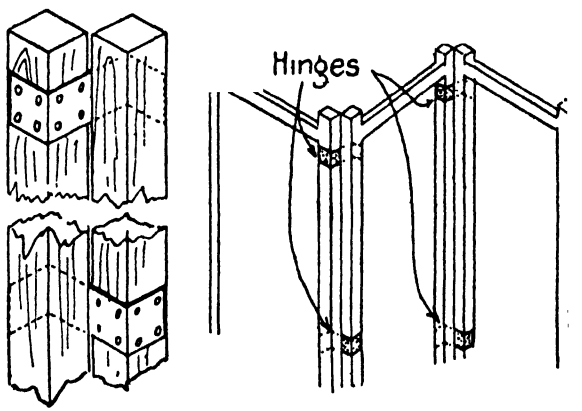
A simple way of removing dirt from the hands, which is useful for motorists after carrying out repairs away from a water supply, is to apply a mixture of equal parts of ground silica and oleic acid, to which has been added a mixture of equal parts of naphtha, soda, and glycerine in the proportion of 5 of the former to 1 of the latter. The mixture can be used as a paste or made into a cream by adding water and mixing intimately.

Another effective method is to first wash the hands in paraffin, wiping

off any surplus oil with a rag, and then to use ordinary Vim and hot water; a little washing soda in the water will improve matters. Local stains can be removed with pumice stone and soapy water.

HINGES OF LEATHER OR FABRIC

In many cases the leather or fabric hinge will answer equally well with the ordinary metal type, and will be found a useful expedient when the latter is not available. It possesses the advantages of cheapness, ease of fixing, and quietness in operation.



The Leather Hinge and its Application.

Referring to the illustration, it will be seen that each hinge consists of two pieces of leather, or webbing, each piece being tacked on the inside of one wooden member, and on the outside of the other member. The two pieces of material are arranged on opposite sides as shown; they may either be close together or apart; the former arrangement is preferable in order to give the effect of a pure rotation. If too far apart, the members hinged may tend to pull apart.

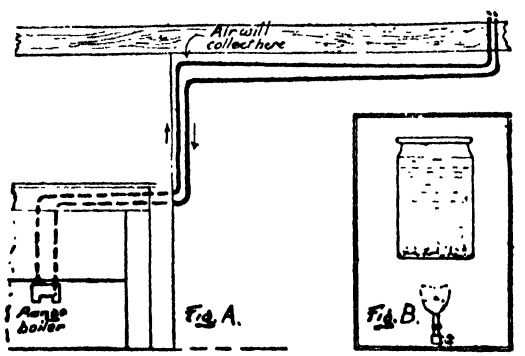
HOT-WATER PIPES, NOISE PREVENTION

Noises in a domestic hot-water apparatus have their origin, practically always, in the boiler. The chief causes are two, viz. (1) the production of steam, and (2) a peculiar action due to loose lime deposit in a flat-bottomed boiler. Another possible cause is air trapped in a pipe bend.

Steam Generation Noises.—It is possible with a boiler of normal power and clear pipes to have the water boil and generate steam if a strong fire is kept and little or no hot water drawn. The steam will not get away silently, and a remedy will be found in closing the boiler damper and, if necessary, drawing some hot water. When, however, noises occur—nearly always violent—under conditions which make the production of steam unexpected, something may be retarding the circulation in the pipes. It may be a growth of lime deposit in the flow pipe (in a hard-water district), in which case the trouble comes on gradually over a period of several weeks or longer; or something may have caused a horizontal pipe to lose the gradual rise these pipes always have from the direction of the boiler. The rise is given to allow air to escape freely, and if not provided or accidentally reversed, air does not escape and the circulation is retarded. Fig. A is given to illustrate this. If, therefore, the

movement of the water through the boiler is made slower, it becomes possible to overheat it. With a good fire the water may be increased in temperature some fifty degrees in its passage over the fire-heated surfaces. But if circulation is retarded the water may be heated to such a degree as to generate steam.

When noises are heard like blows, they are in all probability due to steam. If the water is everywhere hot and the fire fierce, the damper provides a simple remedy; but if the hot storage tank is not fully hot and the return pipe not hot, then the steam must be produced by local boiling, through water remaining in the boiler too long. Occasionally something has been found in a pipe—from well water—but it is exceptional. A simple way of ascertaining whether the circulation is slow is to light the fire when the whole apparatus is cold, and after the fire is burning freely place the hand on the pipe up which the heated water ascends—the flow pipe—and feel its temperature. If it heats all along in a fairly uniform way the circulation is free, but if it gets very hot near the boiler and is noticeably less hot a moderate distance away, then this indicates that something is obstructing the movement.



Showing Causes of Noises in Domestic Hot-water Systems.

There are two forms of hot-water apparatus for domestic supply, one having the hot storage tank, usually a cylinder, near to the boiler; the other having a tank, usually rectangular, upstairs. With the former it is unlikely that there would be a place in the pipes for air to collect, for they are so short, but with the upstairs tank the pipes may get out of alignment. In both there is the possibility of lime deposit in the flow pipe, near the boiler, if hard water is heated.

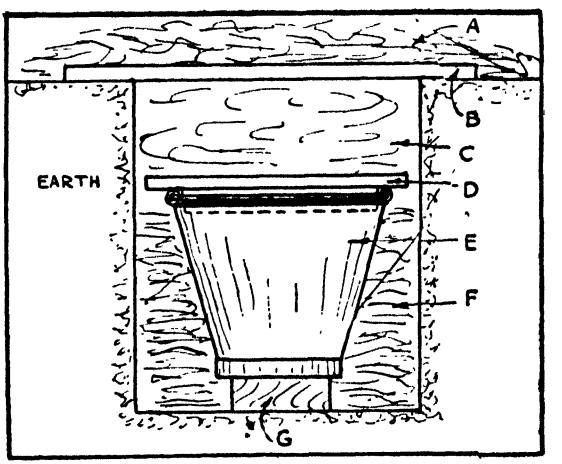
Noise Due to Lime Deposit.—The other cause of noise, loose lime deposit in a flat-bottomed range boiler, has given rise to much uncertainty, as it could not be directly attributed to the accepted cause—steam. It is not a violent noise, but an irregular rumbling with a somewhat sharp note to it, and occurs almost directly the fire is lighted, before the water is hot, or even warm.

Some appreciable time ago the writer fully investigated the matter, when it was found, on opening a boiler afflicted with this trouble, that the noise would cease for some weeks if the lime deposit was cleared out carefully. It was noticed that the lime was not encrusted hard on the boiler plate, but consisted of a loose small material, much in thin flakes, but mostly like sand. It was also noticed that the bottom of the boiler (which was in an ordinary close-fire kitchen range) was flat.

the flue beneath it being formed by the boiler resting on the edge of a 3 in. firebrick on each side. Having noted these details, a 3 lb. glass jam jar was procured having a quite flat bottom. A ½ in. layer of sand was put at the bottom and water added to fill the jar. After the sand had settled the jar was held over a gas flame, and, within a few seconds, noises were heard with slight vibrations, these being plainly the same as was experienced with the boiler, though on a much reduced scale. It was seen, through the glass wall of the jar, that small volcanic cones formed on the flat surface of the sand, and as fast as they formed they burst at the top, at which moment the noise and vibration occurred. Fig. B illustrates this. The trouble is not a very common one, but has been met with several times. It can always be temporarily overcome by cleaning out, or permanently remedied by changing the boiler for one with an arched flue formed in the bottom.

ICE, TO KEEP, IN HOT WEATHER

The following is an excellent method of keeping ice for several days without appreciable loss by burying it in a hole some 3 ft. deep dug in a shady spot behind a shed. The ice is placed in a pail E (see illustration), standing on a block of wood G, and surrounded by damped rags and paper F. (Do not use hay, as it generates heat when rotting.) A lid D, of wood, to keep the ice clean, some more wet cloths and paper C, and a cover B, complete the idea. It is as well to pile some paper and one or two old sacks, shown at A, on top of the lid B. When not required for ice, the freezer or perishable foods can be kept cool in the bucket.



Preserving Ice in Hot Weather.

KITCHEN-RANGE MANAGEMENT

All close-fire ranges, stoves, and the independent coke-fired boiler, which is becoming so popular, depend, for proper working, on the chimney to which they are attached having an effective up-draught. The draught in a chimney is brought about by the air within it being warmer than the outer air, the action bearing some resemblance to that which causes water to circulate in pipes when it receives heat. Warmed air, like warmed water, is lighter than when cold, and the true cause of the movement is a difference in weight or pressure, i.e. gravity. When a fire is at the base of a chimney, sending up heated gases and products, also making the brickwork fully hot, the draught is strongest, but as

brickwork retains heat, it is found that a draught exists in a chimney which has not been heated for a considerable period. Even a new, unused, brick chimney may give indications of an upward movement of air, due to its interior being of a slightly higher temperature than outside. A new iron pipe flue does not show this, nor does iron at any time retain heat for a lengthy period.

Failure to Draw Well.—When, therefore, a range or stove fails to draw well, it is rather seldom that the fault lies with the chimney. This can usually be tried by the simple expedient of opening a sweeping door (in the top plate of the range), or a soot door, and then thrusting in a good handful of lighted straw or paper. The door is immediately almost closed, leaving a crevice to see through, and it is nearly always found that the burning material flames up with a roaring noise, portions of it probably being carried up the chimney by the draught. This action indicates a "good draught."

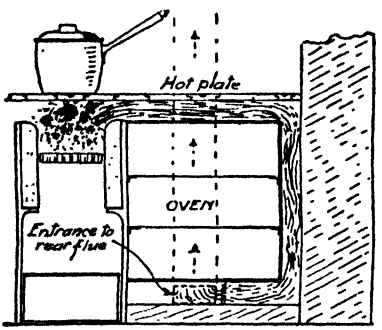


Fig. A.—Section through Ordinary Kitchen Range.

What appears to be often overlooked is that range and stove makers, when designing their goods, rely on the draught exerting itself—pulling all its air—through the fire-box, where the fuel is. Combustion in these appliances has to be strong for two reasons, one being that the heat must be intense for the work that the small fire has to do, the other that (particularly in the case of a range) heat has to be carried so far and be effective over an extensive surface.

Fig. A shows the fire and oven of a range with the front plates removed, and a quite brief explanation will show what the draught has to do. The air current must be strong enough to make the flames and hot products (gases) from the fire travel first horizontally, then downwards, then horizontally again before they have a chance to pursue an ascending course as would be natural to them, and the travel has to be swift, otherwise the oven will heat unequally or poorly, perhaps insufficiently. Although ranges may differ in character somewhat, practically all of them require the draught to carry the flame much in the manner described, and it is, in the majority of cases, a loss of draught that causes reduced efficiency or failure. Of course ill working may be due to broken brickwork of flues, making resetting necessary; but as most failures have to do with draught, this will be discussed.

Assuming that the chimney has a normal draught, what can prevent this drawing the flame around the oven, heating it and heating the hot-plate above it? Dirty flues, choked with soot, may be the cause, but this need not be dwelt upon, as everyone tries cleaning the flues to improve the working. What has to be sought for and located is a loss of draught between chimney and fire. The golden rule in range fixing is that all the

air which passes through the chimney must first pass through the fire. There must be no other flues, openings, or even crevices by which air can get into the chimney without going through the fire, for, if there is, then the fire is deprived and results suffer.

Common Causes of Draught Loss.—A common cause of draught loss is another flue running into the range chimney, notably the copper flue. Although it was just stated that other flues should not enter, it is permissible for a copper flue, or that of a small independent boiler, provided that these have sound-fitting dampers to be closed when they are not in use. When they have fires alight they contribute heat to maintain the draught. Copper flues are often without dampers, or when a damper exists it may not close (being too short). This should be investigated.

A ventilator in the chimney breast is a cause of failure, as it allows unheated air to be drawn in, which cools the chimney and reduces the draught through the fire probably by a half. It may ventilate the kitchen, but it is better to paste a piece of paper over it and rely on some other means of obtaining air change.

Holes of any kind, for any purpose, if they allow unheated air to pass into the chimney, must reduce the efficacy of the range by making the fire burn sluggishly. This is particularly mentioned, as in several instances it has been found that holes have been purposely made in chimneys to improve the draught—to let in more air, it is said—a perfectly erroneous idea when the fire is of a kind that relies on the up-draught to operate it.

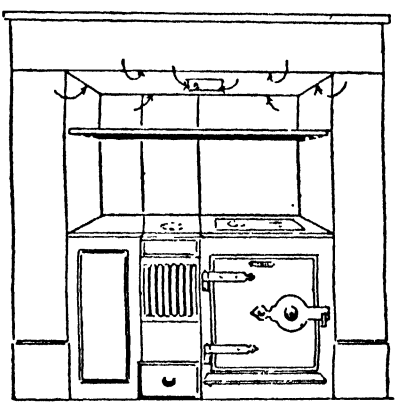


Fig. B.—Places of Air Leakages in Kitchen Range.

Probably the most common cause of draught loss is the unsound fixing of the range itself. A built-in (brick-set) range relies on the fixer making sound with cement all joints around the range. The fixing has to be airtight. He may do this quite well, but in course of time the cement perishes, due to the effects of heat, and leakage follows. It may be up each side of the range at front, and is then readily seen, but a common, unnoticed place is around the covering-in plate at the top of the range, where indicated by arrows, Fig. B. It is easy to test for leakage by holding the flame of a candle, or taper, at the suspected point, any inflow of air drawing the flame in. Joints around the top plate can be made sound with ordinary putty, while joints at front can be cemented up with Portland cement or fire-resisting cement obtainable from ironmongers.

Portable Ranges.—What are known as portable ranges often suffer by neglect in the first fixing, the top plate, closing in the chimney, not being sound nor having a sound-fitting sweeping door; the pipe not being

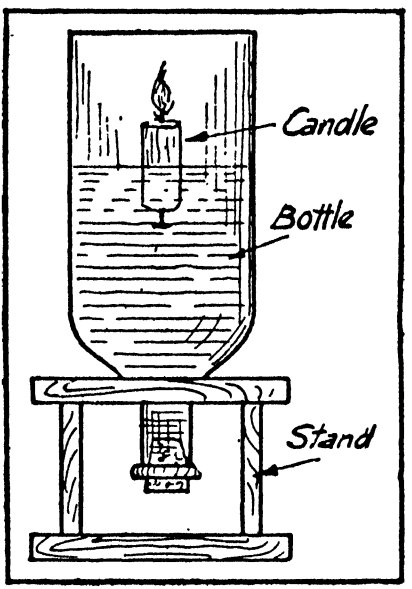
tight-fitting where it goes through the plate, or where it fits on to the range; while the joints in the body of the range itself may have been loosened in travelling or rough handling. The loss or absence of a soot door is always fatal to good working.

Down-draught or down-blow in a chimney will cause a stove to act very irregularly, according to the weather, but this is noticeably distinct from general failure.

LAMP, SELF-EXTINGUISHING

A novel type of night lamp can be made quite simply in the following manner :

Take a round clear glass bottle from which the bottom has been removed. To do this, put into the bottle cold water to the depth of ½ in., then hold it in the red-hot cinders of the fire or over the gas stove. The glass will crack at the height of the water, leaving a clean edge.



A Self-extinguishing Light.

The bottle is held in a stand in an inverted position as shown. Cut two squares of plywood or fretwood about 4 in. square for the stand. In the top piece cut a circle the diameter of which is equal to the width of the shoulder of the bottle. It should be wide enough to grip the bottle firmly and keep it upright. The stand is completed by the addition of four legs about 2½ in. long. The bottle fitted with a tight-fitting cork is placed in the stand, and filled just more than half with water.

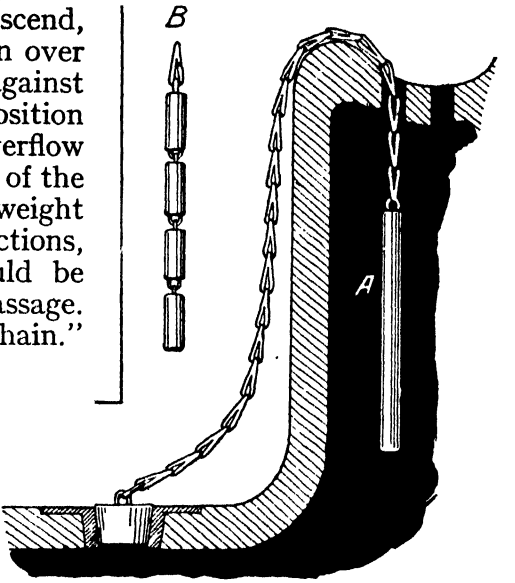
The light used consists of 2½ in. of candle, into the bottom of which a nail is thrust for balancing purposes. This floats on the top of the water in the bottle.

When the candle is almost burnt out, the weight of the nail pulls the stump under the water and so extinguishes the light.

LAVATORY-BASIN HINT

The plug which blocks the waste outlet of the domestic lavatory basin usually is attached to a chain that is always in the way, or has to be stored on the ledge, where it mixes up with the soap or occasionally gets in one's way. The illustration shows how things may be arranged to avoid such trouble. A is a counterweight, small enough to pass through one of the holes of the overflow outlet. It may be made from a length of brass tube filled with lead. A staple should be inserted in the top before pouring in the molten metal. The weight should be rather in excess of the

weight of the plug. When so arranged the lifting of the plug causes A to descend, thus shortening the length of chain over the basin, and the plug rests snugly against the side of the basin in almost any position to which it is lifted. When the overflow openings are in the vertical surface of the basin, as is sometimes the case, the weight must be jointed by making it in sections, as shown at B, or difficulty would be found in passing it into the waste passage. Use the smallest size of "patent chain."



A Lavatory-basin Plug Holder Improvement.

LINOLEUM ON A STONE FLOOR

When laying linoleum on an uneven stone floor, fill up the inequalities with clean, fine sawdust, so making an even surface. This prevents hollows underneath the linoleum, and enables it to wear much longer.

LOCK, YALE, TO OPEN

On the outside of the door or cupboard to which a Yale lock is fitted will be found a circular disc member carrying at its centre the keyhole. The lock can be bodily removed without damaging it, if the key is lost, by first drilling two holes of $\frac{3}{16}$ in. diameter, one on either side of and a little above the key barrel. A pin wrench is made from a piece of rectangular-section steel, by drilling a pair of holes to the same distance apart as those drilled in the lock and driving in cast (or silver) steel pins to suit the $\frac{3}{16}$ in. hole. An adjustable wrench can be used on the flat bar to assist in unscrewing the pin block and key barrel until the tongue inside the lock rotates sufficiently to withdraw the lock catch when the door is free to open.

Another method of opening a Yale lock, but which destroys the lock for future use, is to drill a hole perpendicular to the outside circular face, with its centre on the outer periphery of the rotating barrel immediately above the top of the keyhole. This will drill right through all the drivers and thus leave the barrel free to rotate if a screwdriver blade is used in the keyhole.

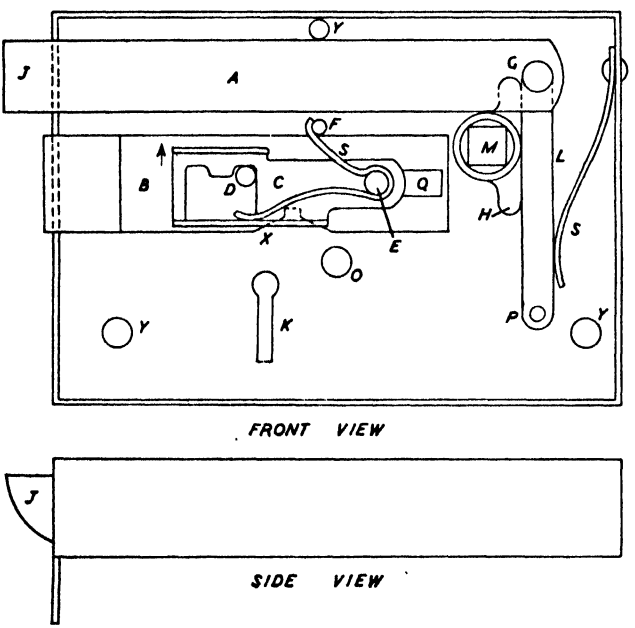
LOCKS, DOOR, MAINTENANCE AND REPAIR

The ordinary door lock gives long service and seldom goes wrong, but if it does, then a knowledge of its operation will enable the handyman to repair it, with little difficulty, and thus avoid the cost of a new lock.

Before dealing with the repair and maintenance of door locks it is necessary to describe a typical lock so that the items needing attention can readily be understood. There are various types or designs of door locks in common use, but these—with the exception of the Yale and similar locks—are nearly all based on the same principle, namely, of a spring catch which holds the door closed merely by shutting the door and it is released by turning the door handle; and another bolt member for actually locking the door, by means of its key.

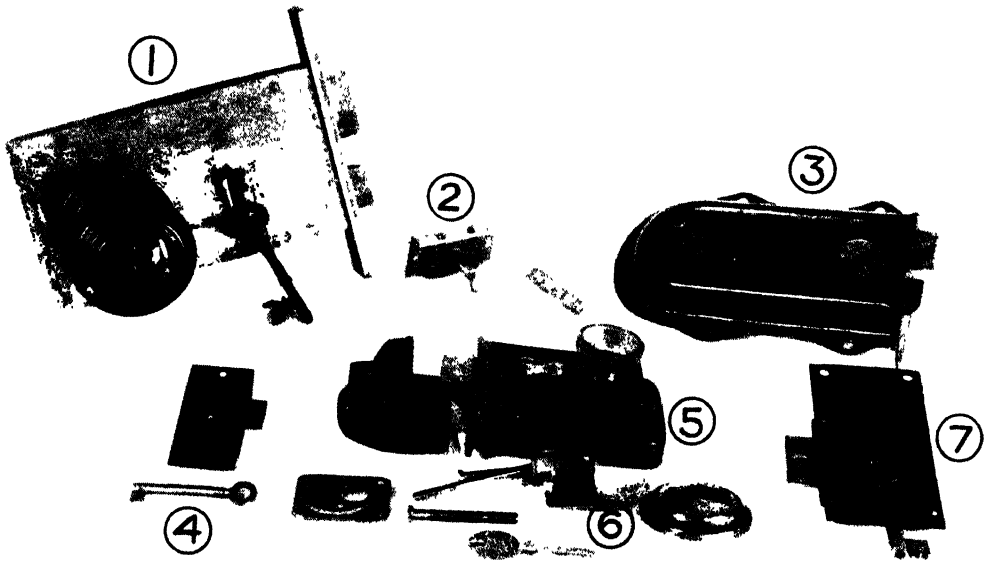
The illustration shows a typical lock with the back plate removed—the latter is merely held by a countersunk screw which engages with the tapped hole shown at O.

Dealing with the spring catch part of the lock, first, the catch portion J, having a curved face to engage with the catch plate, forms part of a rectangular bar A, which is hinged at G to another lever L which, in turn, has a fixed hinge P; the hinge G is movable. The door handle is fixed to a square-section bar which passes through the square hole M in a cast piece H, having two lugs or projections, as shown. The lever L is held up against the lugs on H by means of the spring S, which is riveted to the lock case, at its other end. When the door is pushed to the closed position the catch J (see lower illustration) is depressed by the edge of the catch plate, so that the bar A is moved to the right, pushing with it the end G of the lever and thus slightly rotating the lever about its fixed pin P and against the spring S (on right). As soon as the catch J enters the hollow in catch plate it resumes its original position under the spring action, i.e. it returns to position shown in upper front-view illustration. To release the catch the handle (not shown) is turned and this turns the cast piece H, thus moving the end G of the lever to the right. It will be noted that M can be turned in either direction, i.e. clockwise or anti-clockwise, to move J to the right.

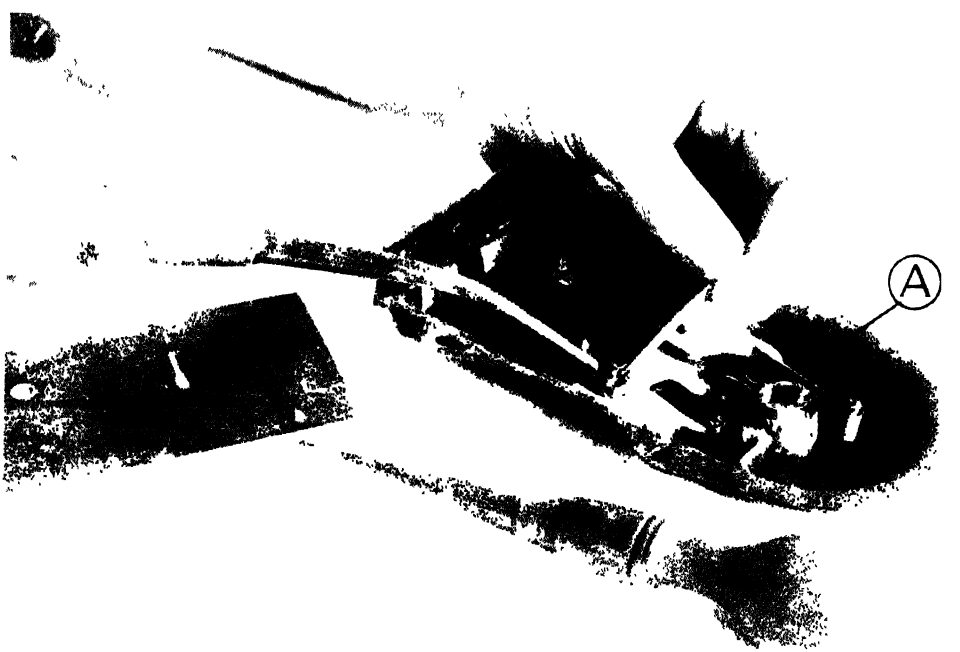


Illustrating Construction and Operation of Ordinary Door Lock

The locking bolt unit B is of rectangular section and slides in guides, namely the rectangular hole in the casing, on the extreme left and a slotted portion Q on its right-hand side.



Types of Lock (1) Mortice Lock and Key (2) Drawer Lock and Hasp (3) Rim Lock (4) Small Deadlock Yale Latch (6) Barrel and Cylinder of Yale Latch (7) Cupboard Lock



Remove the Lock from the Door, lay the Lock on the Table and clean out any Dirt from inside. Next, apply a Small Quantity of Light Machine Oil to all Working Parts. The Spring shown at A is the only part that, through fracture, may need replacement.

LOCKS, MAINTENANCE AND REPAIR.

There is a specially shaped metal piece C, hinged at E to a fixed pin and held down by the hairpin-type spring S, anchored at E and F and pressing on a projection on the lower part of member C. It is restrained from downward movement by means of a pin C, which is fixed securely to the bolt bar B. Thus member C can pivot about pin E up or down by a limited amount, against the pressure of the spring S.

Now the bolt bar on plate B has a depression cut at X and when the key is inserted in keyhole K and turned anticlockwise the lower end of the key plate portion engages with X and at the same time lifts the locking member C clear of the pin D, so that further movement of the key forces the bar B to the right so as to lock the door in the catch plate. When fully moved to the right the member C drops down so that the left-hand notch is over the pin D; this locks the bolt B in position. When the key is turned clockwise to open the lock it first enters the depression X and lifts the member C clear of the pin D so that the bolt bar can be turned to the right by further rotation of the key.

When Fitting New Lock.—Before fitting a new lock remove the cover or back plate by taking out the countersunk screw from hole O. Then apply, thinly, car-grade grease to the sliding parts of B and J, i.e. in the casing guide and at Q, working these sliding members several times until they are well coated with grease. Apply, also, a little grease to the working faces of X, C, and H, and to the bearings of the latter member, in the lock casing. The pin at G should also be oiled with a thick grade of oil.

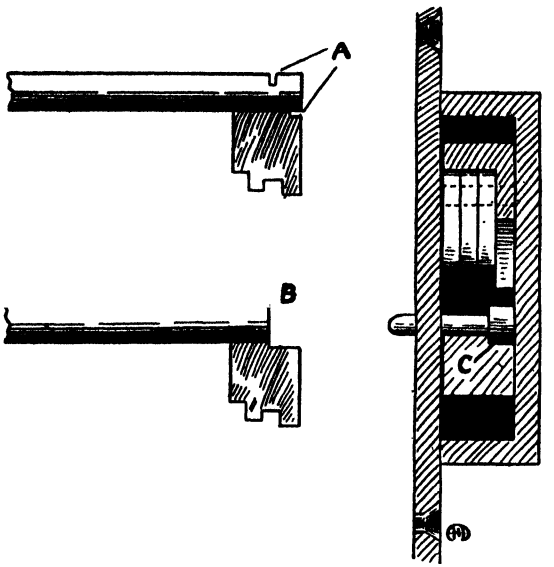
The Lock Springs.—These are the only parts of the lock which may give trouble, since after many years of use, unless they have been well protected against rusting, they are apt to break off and then the lock fails to function. To avoid this, it is a good plan to coat the whole of the spring surface liberally with car or graphite grease, so as to protect the whole surface. A range of sizes of spare springs is sold for replacements.

A lock thus treated will last for at least 20 to 30 years before any attention is necessary.

Minor Items of Attention.—After a door has been in use over a period of years it may shrink or warp so that the lock members A and B will not fully engage with the catch plate. In such cases it may be necessary to remove the lock and pack it out towards the catch plate, before screwing it to the door again.

Sometimes, also, the catch plate will, through constant hanging of the door, sink into the door frame so that the catch J and bolt B will not engage. It is then necessary to pack out the catch plate by inserting strips of hard wood between its edges and the door frame.

The screws holding the lock to the door, through the holes shown at Y in the front-view illustration, should be checked for tightness about once every year. The sunk screws which hold the door handles to the square bar through M should also be checked for tightness occasionally, or when the door handles show any slackness on the bar in question.



Lock and Key Improvement.—Here is a key which may be of use to readers who wish to make their locks safe against the use of duplicate keys.

To do this all that is required is to cut off the projecting end portion of the key (A), with a hack-saw, leaving it as at (B).

Having done this, gently squeeze the detached portion and push it on to the fixed guiding pin (C) of the lock, where, if necessary, it may be secured by soldering.

This in no way interferes with the action of the lock, and other people are prevented from having access to whatever is being kept under lock and key. Only $\frac{1}{8}$ in. need be cut off the key barrel.

Any lock furnished with a guiding pin can be treated in this manner.

MANGLE ROLLERS

The fitting of a squared spindle in a mangle roller may be undertaken by the following "burning-in" process, rollers being ordinarily bored $\frac{1}{8}$ in. larger than across flats of square part of spindle.

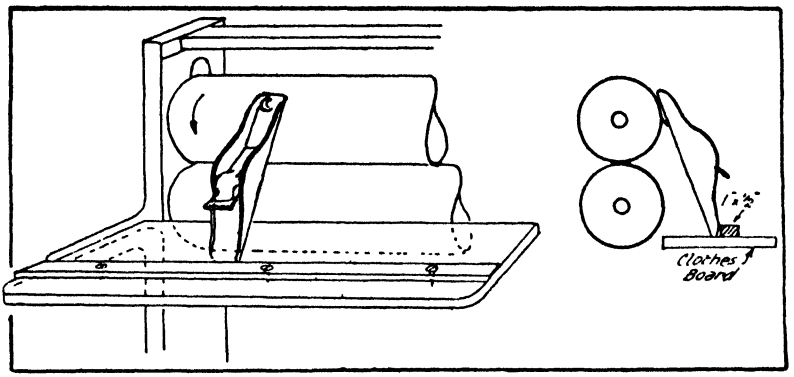
Have a tub half full of water under the tap or hosepipe. Heat 6 in. red-hot of the square part of spindle, nearest to the long round end on which the wheels sit. This can be done in the kitchen fire if pushed well in. Have the roller end up on a heavy kerbstone in the back lane and quickly push the hot end in the hole, give a tap or two with a heavy hammer, and, holding roller in the hands, reverse end for end and bump the spindle right in on the stone. Put under running water immediately and cool off. The charring has a preserving effect.

MANGLE ROLLERS, TO TRUE

The accompanying sketch illustrates a method of truing a pair of mangle rollers, the only tool required being a plane and a straight strip of 1 in. by $\frac{1}{2}$ in. wood.

The plane is set so that the knife edge is opposite the centre of roll, as in a lathe, only the plane is slanted instead of at right angles. After setting the plane, the strip of wood is placed at the bottom of same, and fastened to clothesboard by means of screws, care being taken to have strip square with sides of roll. In operation the plane will shave off the largest diameter, and will obviously lean forward when moved to

worn parts of roll, thus keeping knife edge clear. Should the rolls be worn very badly, care must be taken not to shave off too much, as this would let the gear teeth in too deep.



Method of Truing Mangle Rollers.

For the bottom roll the same tools are used, but different makes of wringers make it difficult to give an exact method, so it must be left to the reader to devise the best way of doing same.

MARBLE, TO CLEAN

Apply freely with fibre brush the following mixture, and allow to remain on for at least twenty-four hours, when it should be washed off with clean water and the surface can then be rubbed over with whiting with a wash-leather. Take 1 part of powdered pumice stone, 1 part of finely powdered chalk, and 2 parts of sodium bicarbonate. If there are any ink stains, they can be removed by applying a strong solution of oxalic acid. Oil stains may be removed by rubbing with fuller's earth saturated with benzine. The above recipe has been proved very effective, although in obstinate cases it is necessary to apply the mixture of soda, etc., two or three times, until a perfect whiteness is obtained.

MATTRESS REPAIRS AND RE-COVERING

Covered mattresses are of two main types, namely, the overlay mattress, stuffed with hair, flock, or other similar filling, and the box-spring mattress which consists of a rigid framework containing steel springs with a top layer of stuffing. Many makes of overlay mattresses, however, contain steel springs, while the original box-spring mattress with its wooden sides and bottom has given place largely to improved models with wood or steel frameworks and springs of other types in innumerable variety. This does not mean that these proprietary mattresses representing improvements upon the box-spring or overlay mattress of a generation ago are necessarily more difficult to repair, for it will be found that they embody the same principles more or less, and can be dealt with in similar

ways. For example, in the box-spring mattress the springs are laced together with cord, whereas in some of the other models wire or chain is used for this purpose; in such cases simple repairs could be carried out with cord, although material similar to that originally used would, of course, be more suitable.

Filling for Overlay Mattresses.—The most important part of a mattress—no less important because it is out of sight—is the filling; and when the question of renovating a mattress arises this should be one of the most important considerations. It is not essential either to use again the old filling or to procure new filling of similar kind; and if the old filling is of poor-quality rag flock, a better filling could be substituted if the mattress case is thought to be worth it. In any case new filling is desirable in the case of rag flock unless this is thoroughly washed in hot water, and it may be mentioned here that new rag flock can be up to the standard of cleanliness required by the Government under the Rag Flock Act and still be far from pure, while it is notorious that the Act is continually being evaded by a small minority of unscrupulous manufacturers, who, if convicted, can well afford to pay the fine imposed out of their extra profits. Flock for mattress filling consists of various substances torn up into shreds by machinery, cotton flock coming from the pods of the cotton plant. The best filling is horsehair, curled so as to increase its resiliency. Next comes wool flock, followed by the other flocks in many degrees of quality. Alva Marina (seaweed), Algerian fibre (a kind of grass), and coconut fibre are other fillings used. Any of the foregoing may be used separately, or in combination, hair and wool being a mixture often met with. A recently introduced filling is cotton felt in layers about 2 in. thick.

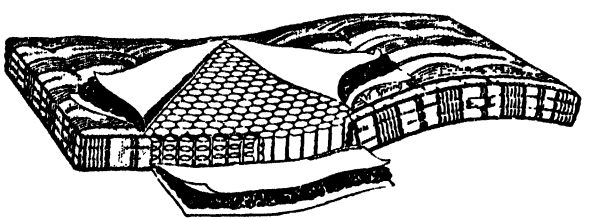


Fig. A.—Showing Construction of Spring Mattress.

Brief mention may be made of the straw mattress or palliasse, used in the case of a lath bedstead. This is similar to the overlay mattress with the exception that the filling consists of straw, fine unpressed wheat straw being the best for the purpose. This is packed in tightly and evenly, running all one way. The stitching, edge-quilting, and tufting are the same as for the overlay mattress.

New Mattress Cases or Coverings.—These can be bought ready made or made at home from ticking which is sold for the purpose. This ticking is supplied in 54 in. width, which is just the width of the largest-sized mattress commonly used, namely 4 ft. 6 in. The standard length for all mattresses is 6 ft., and the width of any particular mattress is governed by the width of the bedstead for which it is to be used, 3 ft., 3 ft. 6 in., 4 ft., and 4 ft. 6 in. being the usual sizes. The ticking, which can be had in several qualities, having been procured, it is cut out on the lines indicated by Figs. B

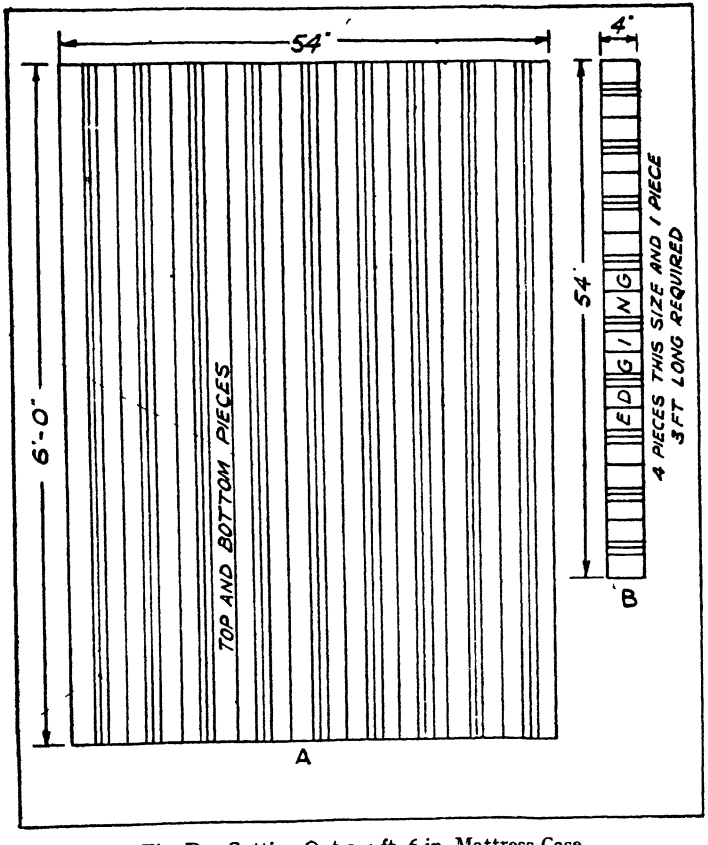


Fig. B.—Cutting Out a 4 ft. 6 in. Mattress Case.

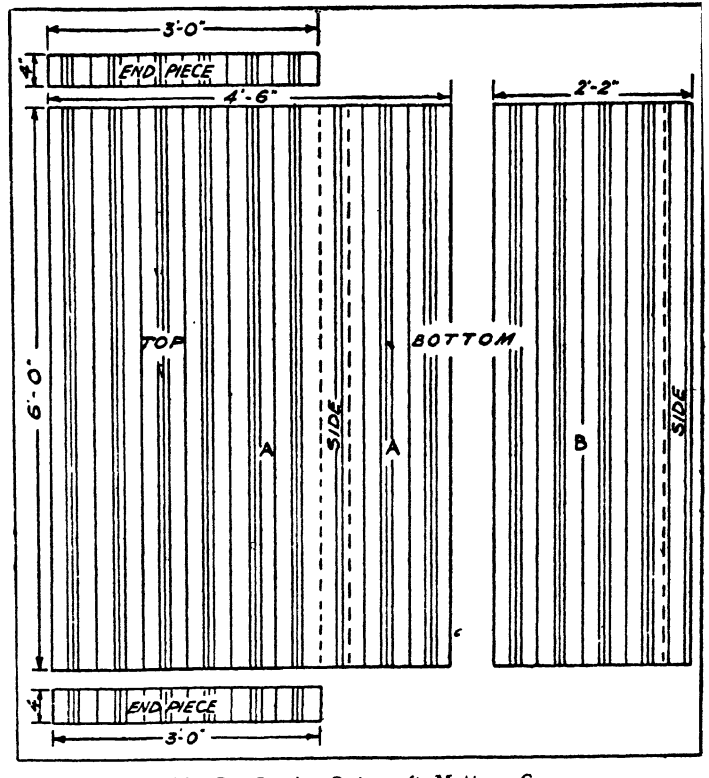


Fig. C.—Cutting Out a 3 ft. Mattress Case.

and C, from which the length of material required for 3 ft. and 4 ft. 6 in. mattresses respectively can be calculated. The other two sizes are dealt with in a similar way to the 3 ft. size.

In addition to the ticking, sufficient piping about ¾ in. wide will be required to go right round the edges at top and bottom of mattress, and another foot or so for the four corners. In the cutting out a little should be added in all cases to the measurements given to allow for turning under at the seams in the case of the ticking, and joinings in the case of the piping.

To make a 4 ft. 6 in. case, cut two pieces 6 ft. long for top and bottom (A, Fig. B), and sufficient edging 4 in. wide to go all round the case (B, Fig. B). The case is then machined together, a gap of 18 in. being left in the top seam at one end for putting in the stuffing. The piping is now stitched, leaving it free along the gap at end, after which the case is ready to be stuffed. Fig. C shows the method adopted in the case of a 3 ft. mattress, the piece AA being the full width of the ticking, and the piece B being 2 ft. 2 in.; when these two pieces have been joined together side by side, the two outer edges are joined to form the case, the dotted lines indicating where the 4 in. side sections occur. The two end pieces and the piping are then added, a gap being left at one end as before.

Stuffing.—For the process of inserting the filling, the case will be laid on a table or bench large enough to take it, two tables being placed together if necessary. If the old filling is to be used again, it must first be well beaten with a piece of wood, and then picked apart. The quantity of filling required for a mattress is approximately 2 lb. to the square foot, e.g. a 6 ft. by 3 ft. size would require 36 lb. About half of the filling is put into the case first, and packed evenly into position with the hand, the corners and edges receiving special attention. Then the other half is added in two or three separate lots, after which the opening is sewn up by hand, and the piping attached to correspond with the remainder.

Tufting.—The tufting is done in two stages, the first, which will now be proceeded with, being the insertion of the twines. Fig. D shows the positions of tufts for a 3 ft. mattress. Other widths will, of course, have more tufts arranged in a similar way. A 12 in. mattress needle and mattress twine are used both for the tufting and for the edge-quilting to be described presently. For the tufting, the needle is taken down through mattress, inserted on the under side ½ in. from where it came out, and brought to top again, so that by cutting off the twines two free ends are left at each tuft mark. These ends are then formed into a slip-knot as shown by Fig. E, the whole being left in the position shown by B, Fig. E, for the time being.

Edge-quilting.—Edge-quilting or blind stitching is necessary to keep the filling up to the edge of mattress, and this is now carried out, first round the top, and then round the bottom, the mattress being turned over to do the latter. Fig. F illustrates the method. The needle is passed in at

the point A, 2 in. from edge of mattress, and brought out at about one-third down the side at B. Then it is reinserted ¼ in. farther on and brought

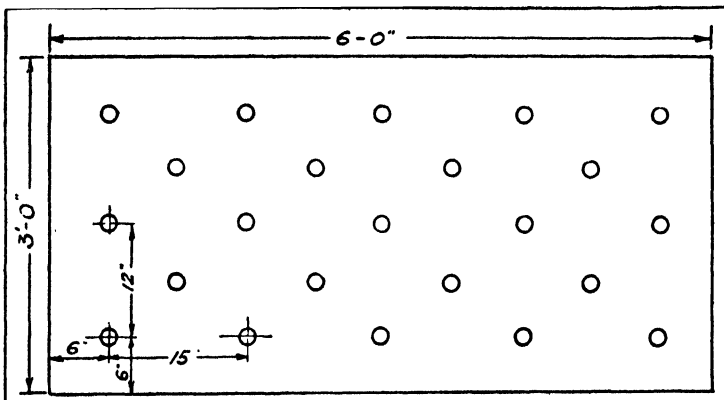


Fig. D.—Position of Tufts in a 3 ft. Mattress.

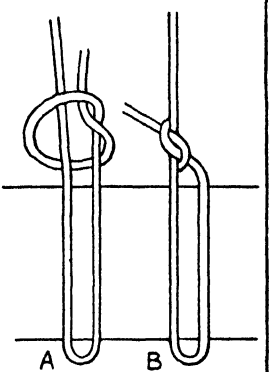


Fig. E.—Tufting Twine showing Slip-knot.

out at C. At this point the stitching differs from ordinary stitching in that the needle is taken back through the same hole, C, the hole being then closed up with the point of the needle. Now the needle comes out at D, the twine is pulled fairly taut so that it assumes the form shown by the dotted line inside the mattress, and succeeding stitches are worked in the same way right round the mattress. When the first length of twine is used up, another is tied to it, and the knot drawn to the inside of mattress, and when the starting-point is reached, the twine is knotted off to the first end.

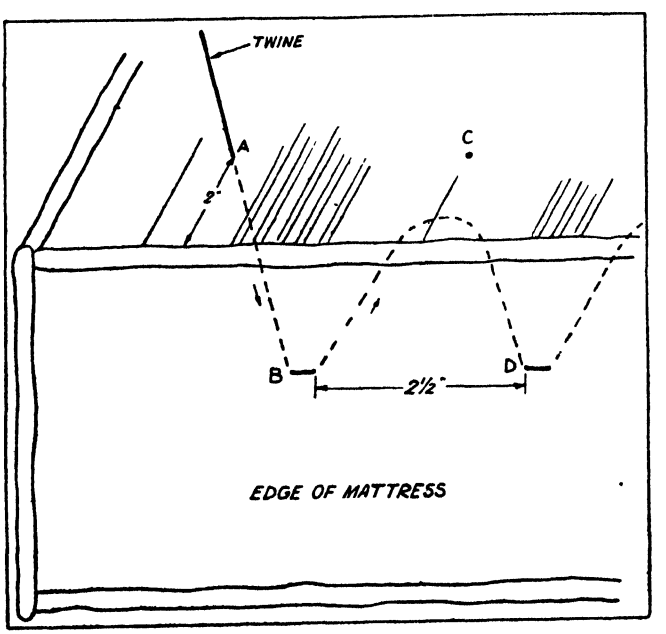


Fig. F.—Edge-quilting of Mattress.

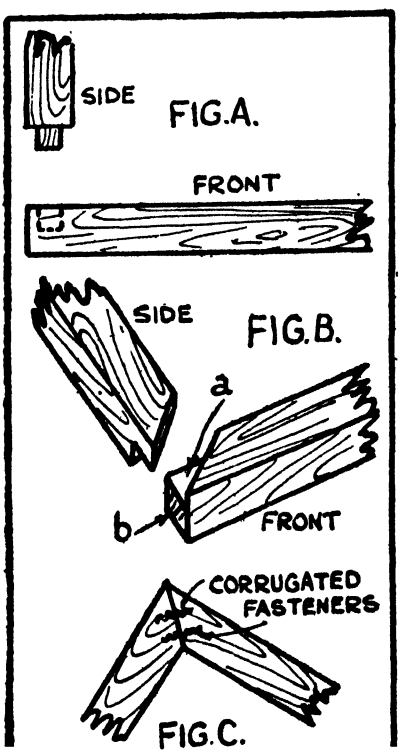
The mattress will have been turned over to do the second row of edge-quilting, thus bringing the loops of the tufting twines uppermost. Tufts—which may be of wicking, wool, or leather—are now placed in

position, one under each loop, and the mattress is turned right side up. Tufts are then placed under the twines at top, each slip-knot being in turn drawn up fairly tight, and the free end of twine knotted securely round it.

The foregoing covers all the work involved in making an overlay mattress, and, therefore, provides the information required to execute minor repairs with the exception of patching the case. This is best done with the filling removed so that a machine can be used, but small patches can, of course, be sewn on by hand. Tufting or edge-quilting is removed where necessary, and re-done after the patching.

NICKEL-PLATED OBJECTS, TO CLEAN

Objects which have been nickel-plated occasionally show spots of corrosion on the surface. This may readily be removed by coating the spots with a solution consisting of a mixture of 1 part sulphuric acid and 50 parts alcohol. After allowing to act for a few seconds wipe off with a rag, rinse thoroughly with clean warm water, and finally rub dry with sawdust.



Alternative Oak Kerb Joints.

Nickel plate can be cleaned with the ordinary paste or liquid abrasives used for household purposes, but it must be remembered that each application of such an abrasive takes off a minute layer of nickel oxide and the base nickel so that constant use will, in time, expose the base metal to which the nickel is applied. A smear of vaseline or lanoline will protect nickel-plated parts when not in actual use.

OAK KERBS, TO JOIN CORNERS

The following joint, used in bay-window construction, provides a strong joint for oak kerb :

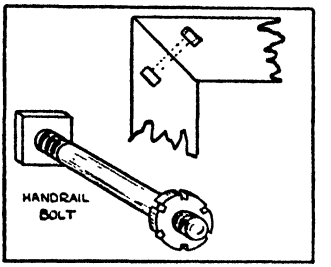
Mitre the ends and join with a 4 in. handrail bolt as follows : place bolt in position across mitre as shown, with nuts fully extended. Set out for bolt by centre line across mitre and square down on edge. Gauge half-way down depth of kerb, and mark centre for drilling the same diameter as bolt. Drill holes about ½ in. deeper than length of bolt to allow for tightening up. Place bolt in position and mark out mortises for nuts. Chop out, taking care not to go too deep, so that square nut turns round when in position.

Drop square nut in mortise and screw bolt in till full nut is obtained and drop round slotted nut into other mortise. Turn this round and tighten joint by knocking slotted nut round with nail punch. After

testing for good joint slacken nuts, apply glue, tighten, and leave to set. If desired plugs may be fitted to fill mortises.

Alternative joints are as follows: Fig. A illustrates a square joint where the side members are blind-tenoned into the front member.

For a strong mitre joint Fig. B serves very well, the lap portion "a" being on the front member, as this brings the end grain "a" at the ends where it is not noticeable. A simple mitre joint can also be made as in Fig. C, front and end pieces being cut off in the mitre box, then glued and held together by two strong corrugated fasteners.



Method of Securing Oak Kerb Corners.

OILSTONE, CARE OF AND TRUING

Oilstones should be kept in wooden boxes, with their lids in place whilst the stones are not in use. This prevents dust deposits and protects the surfaces against accidental damage.

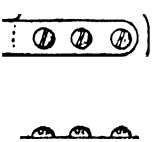
Worn oilstones can be trued flat again by rubbing briskly on a smooth concrete surface, the side of an abrasive grinding wheel or on a block of cast iron to which a mixture of coarse abrasive powder and oil have been applied.

A new oilstone should be soaked in oil for a day or two prior to using it. Dirty oil should be wiped off an oilstone before using it; otherwise the oil, with its steel particles, will dry into the surface.

Do not forget to use the edges of rectangular oilstones for sharpening small tools.

PAPER-CUTTING KNIFE

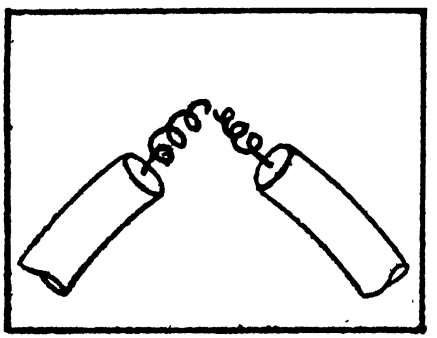
A most useful knife for cutting cardboard or paper, and for trimming up photographic prints, to give a really clean cut, can be made by anyone in a few minutes with a piece of flat bar iron and an old used safety-razor blade. The flat bar is bent double, as shown, and the ends nicely rounded off with a file, and then, using a razor blade as a templet, two or three holes should be drilled for suitable bolts and nuts. Two holes will usually be sufficient. The handle need not be above $\frac{1}{2}$ in. by $\frac{1}{8}$ in. iron of a length to suit: as a matter of fact the handle used by author was a 12 in. Meccano strip bent double; Meccano nuts and bolts were also used. When the blade is dull both sides, do not replace for a while, but turn blade upside down, as usually only the top half of each side of the blade is used in cutting.


Paper-knife, Using Safety-razor Blade.

PERAMBULATOR TYRES, FIXING

Most perambulators to-day have their tyres fixed by means of a wire running through the centre of the tyre.

Some of the smaller folding perambulators, or push-cars as they are called, may have the tyres cemented on, but this method is now obsolete, and no up-to-date shop would tolerate this old, slow, and dirty method. If, however, the "stick-on" method is employed, tyre cement should be used. This would have to be melted down by placing it in an old saucepan, over a gas ring, until the cement becomes liquid, when it should at once be poured into the rim of the wheel. It would help considerably if the wheel rim was previously warmed all round, and also warmed again after the cement was poured in and the tyre fixed. The cement should be poured into the rim all round, then the tyre fixed. Afterwards spin the wheel rim through a gas flame until the cement actually oozes out of the side of the rim. The wheel should be allowed to cool for some time before using. Liquid cement can also be bought.



Method of Joining Ends of Perambulator Tyres.

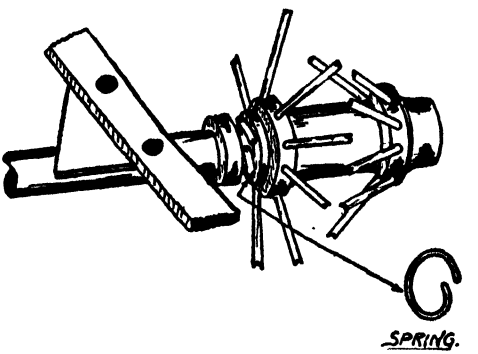
Wired-on Tyres.—As to wired-on tyres, there are two sorts. In one system the wire is already embedded in the tyre; in the other, the wire is not embedded, but is inserted when the tyre has to be fixed. The former system is simpler and quicker, and is best suited to be done by an amateur. Procure a length of the proper *thickness* of tyring with the wire already embedded. Place the tyre in the rim and cut it off, for a 12 in. diameter wheel, ½ in. short in circumference. With a knife slice off about ¼ in. from each end of the tyre, leaving two or three turns of the spiral wire protruding. See that the coils of the wire are not bent out of their proper shape (if they are crooked, cut the bent part off with a pair of cutting pliers). Take the ends of the tyre, one end in each hand, and twist the tyre to the *right* two or three turns. Now insert the two ends of the tyre one in the other until the two ends of the coiled wire become fitted into each other. You now twist the ends of the tyre in the *opposite* direction, when a flush joint is obtained.

The tyre can then be sprung on the rim, putting the join in the rim first, then gradually forcing tyre on to rim.

PERAMBULATOR WHEELS, CURE FOR NOISY AND SLACK

When the wheels of perambulators and children's toys, etc., become worn and noisy, they can be effectively "washered" up for further service and without the noise again appearing. Obtain a medium-compression spring to fit the axle just freely, cut one coil off with an old chisel (do not

spoil a new one), round off the ends to prevent cutting. The accompanying sketch shows a spring cut ready for inserting on axle. Insert it between the axle shoulder and inside of wheel, replace washer and pin at the outer end, lubricate the wheel and spring to ensure, now, a silent-running wheel. Do not put on too strong a spring or it will make the wheels run hard and wear the split pin away; but if a spring is used that just requires a "finger" push to make it flatten against the axle shoulder, it will wear and run evenly indefinitely.



Taking up Wear in Pram Wheels.

Instead of a piece of spring coil plain washers can be inserted between the split pin and the outer face of the wheel, so as to take up the slack. A little clearance, should, however, be left to allow the perambulator to turn a little to the right or left.

PETROL, HOUSEHOLD USES FOR

Petrol, being a solvent of most mineral oils and greases, as well as many vegetable oils, is frequently used for removing stains caused by these substances in textile materials such as clothes, fabrics, carpets, and draperies. If a piece of cotton wool or clean cotton fabric soaked in petrol is rubbed lightly over the soiled spot, the latter will disappear. More than one application may be necessary, and it is advisable to apply the petrol to both sides of the material.

It is *most important* to avoid using petrol in any room or building where there is a naked light, owing to the highly inflammable nature of the vapours given off by petrol. Many fatal cases of burning have occurred in connection with the use of petrol in the home.

The odourless petrol sold for petrol lighters is much to be preferred for cleaning purposes as it is more volatile and, as mentioned, leaves no after smell or stains on clothing. Other cleansing liquids include benzene and carbon tetrachloride (as used in fire extinguishers).

Petrol can be used effectively for cleaning silk gloves, stockings, and garments, table-cloths, brown leather shoes, buckskin shoes, for removing carpet stains, and grease marks on paper.

Articles cleaned with ordinary automobile petrol or benzine should be "aerated" in the open air for several hours to remove the characteristic odours of the liquids in question.

PEWTER, CLEANING

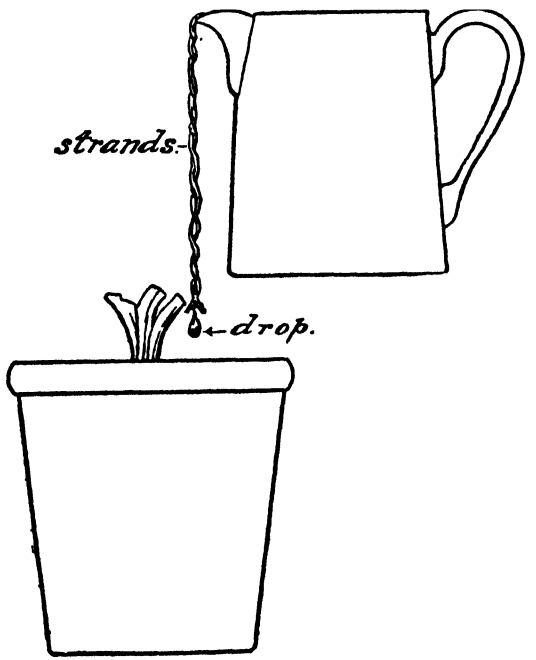
To obtain a bright finish on pewter, the metal should be free from dents and other blemishes and first cleaned with benzoline to remove grease and finger marks. It is then rubbed with ordinary metal polish

applied with a thick felt pad, and then finished with powdered whiting, or with one of the powder plate polishes, and using flannel or a soft rag.

PLANT-WATERING DEVICE

Pot plants, such as ferns, palms, aspidistra, etc., often die of drought during their owners' absence, and many are injured, if not killed, by the mistaken practice of standing the pots in water, which tends to produce mildew, or the semi-rotting of the roots known as "damping off."

The illustration explains a simple remedy for either evil, the earth of pot plants of any size being regularly and continuously moistened during any reasonable period without risk either of drought or of excessive saturation.



An Automatic Plant-watering Device.

A jug, can, or other suitable vessel of water is placed on a slightly higher level than the plant pot and connected thereto by one or several strands of loosened cotton or wool.

In order to explain itself at a glance, the sketch shows a drop of water as falling from the dangling end of the saturated strands, but in practice it is desirable to coil-down several inches of the cotton on the surface of the pot mould, which promotes a more even distribution of the moisture.

A little plant, say in a 3 in. pot, will be served by a simple strand of thin knitting wool, or even of coarse darning cotton. The stouter the strand, of course, the more rapid the delivery; the vertical length of the strand also influences this.

A large plant may be watered by several separate strands of wool.

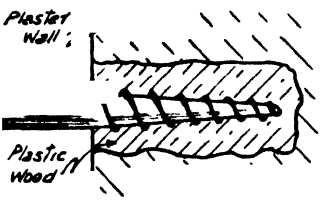
The strands must reach to the bottom of the storage vessel; for outdoor use (as for window boxes) wind-disturbance should be provided for by weighting down the strands in the vessel and pegging them to the earth in the box.

PLASTER WALLS, TO FIX SCREWS IN

The home jobman usually finds it difficult to fix anything to the ordinary plaster and lath wall or ceiling, as the material is too soft and easily crumbles.

Even the widely used Rawlplug and Metalfix are not always satisfactory when used in plaster walls, although in the former case if you carefully drill the holes with an ordinary twist drill the plugs will fit much better, and usually a secure "bite" can be obtained.

It is a good idea to make a bigger hole than is required for the Rawlplug, and to fix the latter with cement, plaster-of-paris, or plastic wood in the hole, allowing it to dry hard before screwing home the wood screw. If a lath can be reached, say, with a bradawl, it is best to bore a tapping-size hole with a gimlet, and then to screw in a wood screw the correct size.



Fixing Screws in Plaster Walls.

A special asbestos fibre plugging compound, known as Rawlplastic is now available for filling ragged and irregular holes. A small quantity is immersed in water for a moment, then squeezed until sufficiently pliable for insertion into the hole like a plug. It is then rammed home with a suitable tool and pierced with a bradawl or similar tool to receive the screw. This product is made by the Rawlplug Co., Ltd., London.

A dense mixture of cotton wool and glue has successfully been used around a screw, supporting the part to be held by the screw until the mixture has set.

Another mixture for holding a nail, hook, or screw in a plaster wall can be made from 2 parts of fine coal ash, 2 parts of washed sand, and 1 part of wheat flour.

(See also "Wall Plugs" and "Wall Fixtures.")

POLISHER FOR GLASS AND METALWORK

A polisher for glass and metals can easily be made at home. Make a calico bag large enough to contain half a threepenny packet of prepared whiting. Empty the whiting into this, and tie or sew up securely. This pad will be found most handy for window panes and all purposes where a quick shine is required on brass, silver, aluminium, glass, etc. When very soiled, the bag can be emptied and the whiting placed in a fresh cover. Separate pads for various uses are advisable.

PUTTY, TO REMOVE

To remove old putty, paint the putty with nitric or hydrochloric acid. After an hour the putty is soft enough to remove, or a hot iron will soften it immediately.

REFRIGERATOR, GAS, CARE OF

The chief domestic maintenance item is that of the gas flame, for if any particles of dirt or corrosion products from the vent tube above the flame fall down on to the flame burner the flame will turn yellow and lose

its heating value and the ice in the boxes inside will melt. A piece of thin wire can be used to dislodge the deposits on the burner. The flame should be adjusted by means of the sleeve on the burner tube to a blue colour like that of a properly adjusted gas stove or Bunsen burner; it then gives the best heating effect and, therefore, refrigeration. Keep the flame clear from door draughts with a metal screen. The gills on the radiator must be kept clean. When not in use leave the refrigerator door open, after thoroughly washing out inside with hot soda water. A trouble sometimes experienced with gas refrigerators is that of *sudden failure to "freeze."* When this occurs the gas flame should first be checked. If found to be correct it may be necessary to disconnect the refrigerator from the gas supply pipe and to turn it completely over, shaking it, also, from side to side a few times. Upon reversal, connecting up, and igniting the gas the refrigerator will almost invariably function again.

SAFETY-RAZOR BLADES, PROTECTIVE SOLUTION FOR

It will be found that Lysol undiluted is a perfect protective solution for razor blades. Simply wipe the blades after shaving, and put them in a shallow earthenware or glass receptacle, and they will be perfectly protected from rust.

An alternative method of keeping blades rustless is to use a miniature portfolio (the cover of an old pocket diary will do) lined with rubber from an old tobacco pouch, the surfaces of the rubber being well smeared with vaseline. A razor blade enclosed in this lasts easily for 2 or 3 weeks though used every day. Stropping should not take place frequently, and should be gentle, or the edge will be worn away.

A Gillette type of razor blade in its holder can be protected by placing a strip of felt soaked in medicinal paraffin or vaseline in its case, at one end. Each edge of the razor blade is pressed lightly on to the saturated felt after using and cleaning the blade.

SEWING-MACHINES

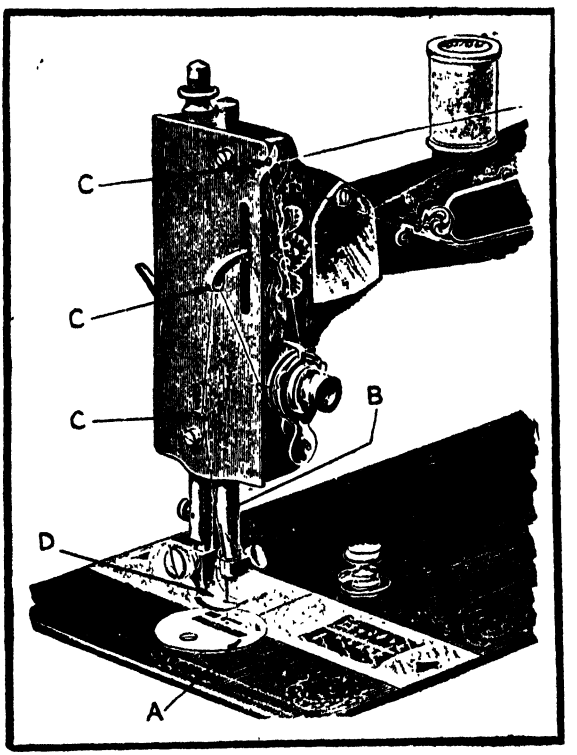
The simplest accidents which happen to sewing-machines are those connected with the needle. Every sewing-machine user knows how needles have a very bad habit of breaking, sometimes without apparent cause.

Care of the Needle.—The most common cause of needle breaking is that the needle is touching either the needle plate or the shuttle. The first thing to do is to make sure that the needle is rising and falling in a perfectly straight line. This is done by means of a straight-edge and the human eye, and the needle is adjusted until it is true. Sometimes the shuttle is worn, and when this is so either the point of the shuttle must be rubbed with emery-cloth to allow it to clear the needle, or else a new shuttle must be bought.

Other causes of needle breaking are: bent needle bar—this can be straightened by a light blow from a hammer; the worker pulling the work along too quickly (the feed should do this task properly, but over very

thick seams it may be necessary to raise the teeth of the feed slightly); the hole in the needle plate may be too small; the edge of the hole may be too square; the needle may be too weak to pierce the material or too blunt to do its task with ease. All these are matters which can be attended to; the needle-plate hole can be put right with a small file, and a blunt needle can be sharpened on a small oilstone.

Causes of Missed Stitches.—The causes of missed stitches are numerous. The same reasons which cause broken needles often cause missed stitches; in fact the wise worker knows that when there are many missed stitches there are likely soon to be many broken needles. In addition, a needle too large or too small for the thickness of the thread will cause stitches to be dropped. It is obvious, too, that if the needle is set too low or too high the shuttle or the hook will catch the thread at the wrong place, and missed stitches will be plentiful.



Sewing-machine Details.

A.—Needle Plate. B.—Needle Bar. C.—Thread Guides. D.—Roll Presser or Foot.

Remedies for Breaking of Threads.—The breaking of threads is most irritating, but it can be remedied. The lower thread breaks when the delivery eye hole in the shuttle is not cut in; when the needle plate has a sharp edge, when the tension is too tight, and when the shuttle race is not well oiled or the bobbin is badly wound. The upper thread breaks when the needle is not set right, when the wrong-sized needle is used, when the shuttle has a sharp or rough edge, when common needles with poor eyes are used, and when the thread comes into contact with any rough surface, such as a rough thread guide.

Adjustments.—Dust and fluff accumulating in joints will cause the machine to stick momentarily, and this will be enough to worry the operator, and after the machine has been taken to pieces for any reason it will often be found that stitches are dropped, needles are broken, and threads keep snapping. This is due to the faulty reassembling of bevel wheels, or cams, and can be corrected by careful alterations.

SHARPENER, UNIVERSAL

Whilst carborundum slips or small blocks can be purchased for domestic use, for sharpening various articles, these are mostly of the unmounted pattern. A better arrangement is the abrasive stone which is securely mounted on a well-designed wooden holder so that it can be used in the manner of a hand file, but with a much finer and harder cutting action.

The Rawlplug sharpener consists of a fine-grained abrasive stone, measuring 3 × ¾ × ⅜ in. mounted on a handle 7½ in. in length. In this form it is very useful for sharpening domestic knives, scissors, shears (garden), lawn-mower blades and garden tools of the edge type. The home mechanic with a small lathe or drilling machine can put a fine finishing edge on his lathe tools, scrapers, drills, etc.

SHARPENING KNIVES

Every cutting edge is a saw of sorts; the pitch of the teeth varies as the nature of the steel—the finer in grain and crystallisation the more closely pitched the saw-like teeth of the edge. It is recognised that, to clear itself when cutting, a saw must have set. In a wood saw the teeth of comparatively large size are set alternately either side of a mean centre line, the degree of clearance being dependent on the material to be cut, the size and pitch of the teeth.

In tools like the woodworking chisel and plane, the workman holds the tool when sharpening at an angle to the direction of motion; this gives a set to the teeth of the edge, and leaves a cleaner surface to the job.

Taking the wood chisel as illustration again, the bevel extending across the tool which is formed by the grindstone is not the cutting angle. This latter is produced on the oilstone, and is less acute. A distinction must be made as to the action of cutting when removing a quantity of material, using a mallet. The wood chisel is then a percussion instrument; but for paring and finishing the edge is used for true cutting and it is here that the set of edge counts.

Carving Knife.—In sharpening a carving knife on a steel, the blade is held at an acute angle to the steel, and the knife is drawn down edge first alternately on each side of the steel. No cutting edge requires more set for its effective use than does this domestic implement. To further the necessity for a coarse large-toothed edge, a good-grade carving knife is made of shear steel, which is very coarsely granular. This also explains the superior efficiency of a hand-made article. The cheaper machine-made knife is, by reason of its manufacture, finer in grain of steel, and thus less effective.

The foregoing is worth consideration for the subject under discussion, as will soon appear.

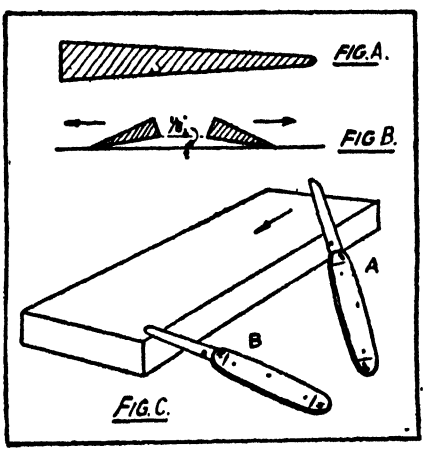
Pocket-knife.—To sharpen the pocket-knife blade effectively, take the handle in the right hand, and approach the oilstone. Place the blade

on the stone with the back or thick edge raised about $\frac{1}{8}$ in. Hold the blade at an angle with the stone, with the point also raised so that the edge of the knife is on the edge of the stone. Now draw the blade forwards and downwards along the stone towards the left. Turn over the blade, keeping the position in mind, and repeat. Three strokes each way will give a perfect cutting edge if the knife is simply dull.

Striking an Edge.—Such a process in Sheffield is termed, "striking an edge." When first shown, it appears that the knife will cut into the oilstone; but such is not the case. Reversal at each stroke prevents the objectionable feature of a feather edge (seen to perfection when an amateur sharpens a dull wood chisel).

Needless to say, when the apparent bevel of the blade becomes too wide, it is then time to thin by grinding, but not before.

The Illustrations.—The accompanying illustrations should make the method perfectly clear. Fig. A is an exaggerated cross-section through the blade showing the cutting bevel. Fig. B shows the position of the blade, with arrows showing the direction of motion; and Fig. C shows the position of the knife on the oilstone, A at the beginning and B at the end of the stroke.



Sharpening a Pocket-knife.

Fig. A.—Cross-section of Blade showing Bevel. Fig. B.—Position of Blades on Stone. Fig. C.—A, Beginning of Stroke; B, Finish of Stroke.

The actual point of contact of the edge of the blade and stone should be a point, not a line, and it should be clearly remembered that the whole surface of the blade does not require sharpening; only the edge is used for cutting and requires to be sharp. Also that a grindstone is not an implement to produce keen cutting edges; its use is for the removal of metal to thin down and shape the blade, the actual production of an edge being a separate operation most suitably done by an abrasive stone of entirely different texture properly lubricated.

SHARPENING SAFETY-RAZOR BLADES

Normally, safety-razor blades are not intended to be re-sharpened, as they are considered to be sufficiently cheap to throw away after use. Most types, notably the Gillette-pattern and Valet blades, can, with the exercise of a certain amount of skill, be re-sharpened on a fine oilstone, such as a turkey stone, if a suitable blade holder is first made for this purpose. The blades are then moved to and fro on the oilstone, keeping the fine angle to the stone of the original blade. Afterwards the burr edge

should be removed on a razor strop in the manner described for solid razors.

There are various proprietary makes of safety-razor blade sharpeners on the market, but none hitherto tested has given anything like the original keenness of the new blade, although most sharpeners will improve a dull blade to some extent.

The tumbler method of wetting the inside of a glass tumbler and then moving the blade in contact with the glass, in a peripheral direction, to and fro, will usually improve the cutting action of a dull blade. There are several trade sharpeners based on this method.

A pair of hard wood or red fibre rollers mounted on pins and set together in the manner of the well-known roller-pattern knife sharpener, will also give good results if the surfaces of the rollers are dressed with a razor strop paste.

SHARPENING SOLID-TYPE RAZORS

In its new or sharp condition the solid razor blade has a section somewhat as shown in Fig. A, but when worn down by constant stropping or incorrect grinding and honing it assumes the section shown (exaggerated) in Fig. B. In order to restore the blade to its correct shape it should either be ground on a fine texture grinding wheel, or else honed down on a turkey stone or fine carborundum stone, as indicated in Fig. C. The stone, which is kept oiled, removes the hump portions, as at H (Fig. C), and leaves the cutting edge at its correct sharp angle. The blade is moved up and down along the length of the stone, with the back or thicker portion resting on the stone. Unless the edge has been notched, sharpening on the oilstone should be discontinued just before an actual cutting edge has been reached. It should then have a burr or wire edge that will bend to and fro as the blade is moved on the oilstone, alternately, on either face of the blade.



Fig. A.—New Blade.



Fig. B.—Worn Blade.

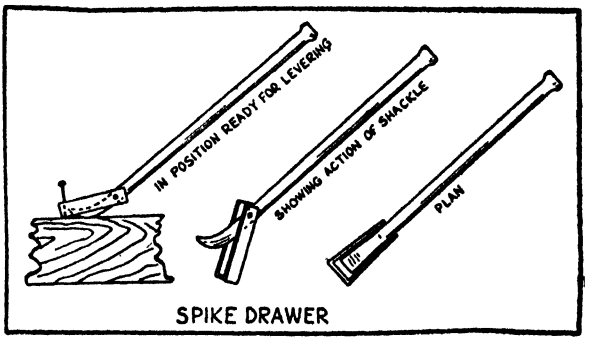


Fig. C.—Method of Honing Worn Blade.

The blade is then ready for stropping on a leather strop dressed with a suitable strop paste. Buff leather is excellent for stropping purposes. A piece of leather strap glued to a wooden holder can also be used, but the leather must be dressed with olive oil, collan oil or a similar softener. Afterwards a strop dressing should be applied. The blade is laid flat on the strop at one end and then moved quickly to the other end, with its thicker end nearer the centre of strop. When it reaches the end the blade is reversed and moved towards the other end, still with the thicker portion inwards and the edge outwards. After a number of even pressure strokes the burr edge is removed and the keen cutting edge attained.

SPIKE DRAWER

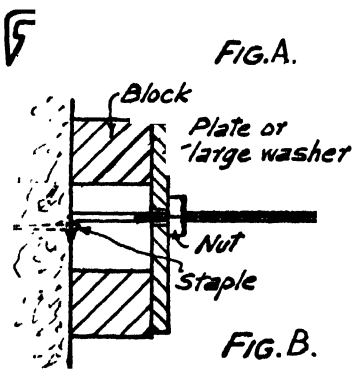
The illustrations show a very useful and powerful tool for the withdrawing of nails and spikes from heavy timbers such as may be encountered in constructional work in shipyards, reinforced concrete construction, and heavy excavation work. The three views shown are self-explanatory, though it may be stated that with a shackle pinned through the bar 4 in. from its tip this tool would be capable of drawing nails up to about 5 in. by ¼ in. thick; larger sizes would require a stronger make in proportion.



Device for Removing Spikes or Nails.

STAPLE EXTRACTING

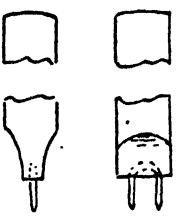
Perhaps the simplest tool that can be used to draw staples which are firmly held in timber is an iron bar, bent, pointed, and screwed as shown in Fig. A.



A Staple Extractor.

The hook is driven behind the staple, an iron tube, tripod, or even a piece of oak with a large hole in it is then placed on the rod, a big iron washer or bar big enough to span the hole in the tube, etc., is placed on after, and finally a nut is screwed on the thread and tightened. This will draw the staple (see Fig. B). By tightening the nut with a spanner it is obvious how the staple will be drawn. A specially made tool could easily be made on the above lines if there were many staples to draw.

STAPLE-DRIVING DEVICE



Handy Device for Driving Staples.

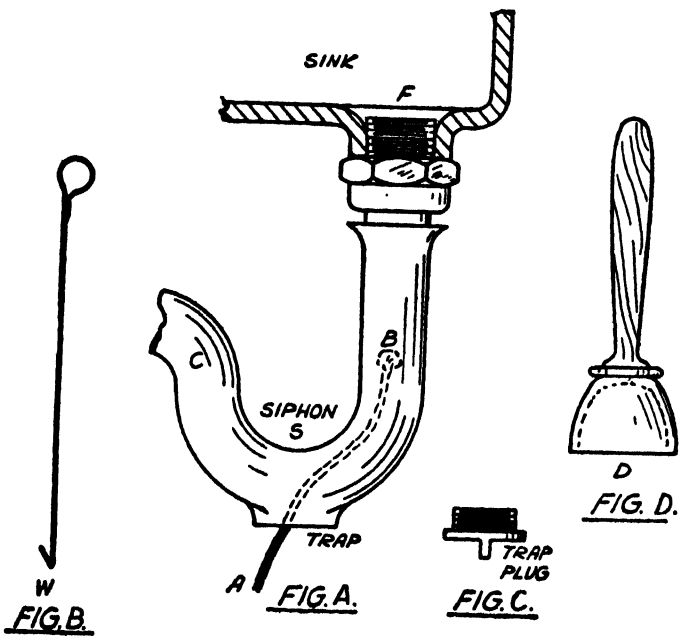
When certain work processes are carried out on a balcony it is sometimes advisable to wire off above the balcony rail with small-mesh netting. On such a job the maintenance carpenter wants three hands, one each to hold the wire, staple, and hammer. The staple holder shown here was devised by a carpenter under such handicaps and answered his purpose admirably. In a short piece of copper rod he made a slot with a drift, the hole being about ¼ in. deep, and just large enough to hold

a staple. To use it he fitted one in the socket, stretched his wire with his left hand, pushed the hasp in by means of the holder, withdrew the appliance and picked up his hammer to drive the staple home.

SINK, STOPPED, TO CLEAR

Domestic sinks and lavatory-basin waste outlets frequently become stopped or partially so with solid matter such as vegetable matter, soap particles, hair, etc.

If the outlet brass plug fitting F (Fig. A) has become clogged the solid matter can be readily removed with a piece of wire bent to the shape shown at W in Fig. B; it will be observed that the lower end has a " bent back " or hooked portion for extracting the clogging material. After removing as much of the latter as possible some hot soda water should be poured down the outlet. If the outlet pipe below the plug F is stopped, place a bowl under the siphon bend S (Fig. A), remove the trap plug (Figs. A and C) with a pair of pliers, and insert a flexible wire up both bends B and C so as to dislodge the obstructing matter. If the wire has a hooked end as shown in Fig. B, it will often catch and bring away with it the solid obstruction. A piece of ordinary Bowden flexible casing makes a good sink " unstopper." It can be inserted either at F or through the trap, and, being flexible, it will adapt itself to bends in the outlet pipe. Special sink-cleaning devices using flexible cable are now sold for the above purpose.



Illustrating Methods of Clearing Stopped Sinks.

In many cases an obstruction in the waste pipe may be cleared away by using the rubber force cup D (Fig. D). This is placed over the outlet, after partly filling the sink or basin with water, and worked up and down rapidly a few times.

Very often it is impossible to unstop a sink waste by the various usual ways—cane, hot water and soda, paraffin, force cup, etc.; and yet there is another and successful way to accomplish the job if a person has a few feet of garden hose, in the following way:

Fix one end of the rubber hose on the main tap for preference, and insert the other end of hose in the outlet of waste pipe (A, Fig. E), and push hose pipe up waste pipe as far as possible, and turn on tap. The pressure of water will force back the obstruction which has become fixed on the outlet way to gulley, and it will immediately be released and come up into the sink. It can, therefore, be removed, and on withdrawing the hose pipe it will be found that the waste pipe is once again clear.

After unstopping a pipe run plenty of water through it to clear away the dislodged matter.

After the usual method of clearing a stopped kitchen sink with a dish-cloth and hot water and soda had failed, a method of utilising the pressure of a motor-tyre pump to clear the pipe was used. The only materials required are an ordinary rubber sink stop such as can be purchased at a local hardware shop for 2*d*. The brass nut and ring attached to this is removed, leaving the rubber part only. The central hole is then enlarged to accommodate an ordinary tyre valve removed from an old inner tube. Air is pumped down the waste pipe, clearing away the obstruction almost immediately. One advantage of this method is that the worse the stoppage, the more readily it is cleared away.

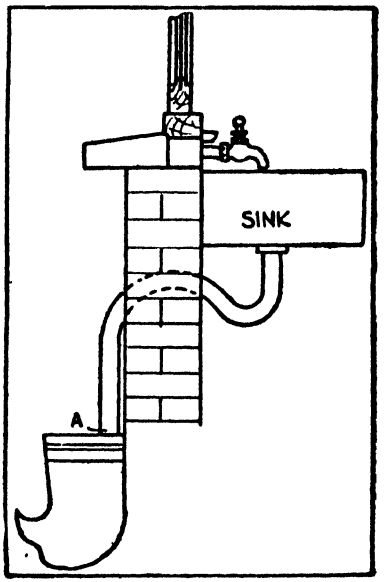


Fig. E.—Unstopping a Sink Waste.

STAINED FLOOR, TO POLISH

The following is an excellent way to polish a stained floor :

Mix together in a bottle ¼ lb. of shellac and ½ pint of methylated spirit. Let the mixture stand for twenty-four hours, then paint over the floor with it, using a flat brush. No more polishing will be needed for three or four months, when another coating of shellac must be given. This method of polishing is excellent for a doorway where the stain has worn off, but in this case the shellac will have to be used more frequently.

STAIR TREADS, HOW TO STAIN

When staining the exposed portions of stair treads, first take up the stair carpet in order to prevent any smearing by the stain. To protect the bottom portion of the banister rails, obtain a piece of tin, which may readily be cut from an ordinary tin can. Bend the piece of tin round the rail, which will prevent any stain from being brushed on. This will greatly simplify the work, and is much better than trying to dodge round the rails with the brush. The stain should be allowed to become quite dry and hard before the stair-carpet is replaced.

STEAM ON WINDOWS AND AUTOMOBILE WINDSCREENS

Many shop windows are found to be almost useless because of the condensation of moisture on the inner surface of the glass, which prevents the goods displayed in the window from being seen.

A cure of the trouble has been the subject of many patents, but one cannot point to any of them which have proved particularly successful. Ventilation in the shape of an open iron grid at the top of the window will sometimes assist in removing the trouble, but as a rule the only real cure is to provide gas jets with Bunsen burners at the bottom of the window, placing them about 18 in. apart and keeping the gas alight all day. Very little light will be given off if such burners are used, but the heat generated will form in effect a wall of hot air which will wholly prevent the condensation of moisture upon the glass.

There are certain preparations on the market for preventing steaming, and rain-spots on motor-car windscreens, spectacle lenses, etc. These are equally suitable for shop windows. They alter the surface tension of the moisture so that it forms a thin transparent film instead of drops.

STRAW HATS, TO CLEAN

Straw hats which have become discoloured by exposure to the sun may be cleaned by rubbing with a solution of salts of lemon in water. The addition of some flower of sulphur is an advantage. The hats should be held with brims and crowns flat, using suitable weights for the purpose, whilst drying, in order to avoid going out of shape. The brim may be fastened to a board with pins to prevent it warping. A waterproof stiffening for straw hats may be made by mixing the following :

Shellac, 300 parts; Venice turpentine, 60 parts; resin, 60 parts; castor oil, 8 parts; alcohol, 1,000 parts.

A non-waterproof stiffener is made by dissolving gum arabic in water to a thin treacly consistency. Apply with a camel-hair brush.

SUITCASES, RENOVATING

Unsightly blemishes on suitcases can easily be removed, and the original polish restored, by separating the white from the yolk of an egg, and painting this over the damaged surface. Allow time to dry, and give another coat. Three or four coats should be applied in this manner. On the last coat drying, it will be found that the leather is restored to its original condition. The albumen in the egg also forms an efficient protecting layer on the leather, making it as good as new.

Worn leather-covered furniture can be successfully treated in the same manner, but not artificial leather. Brown boot polish is suitable for restoring and polishing brown leather and fibre suitcases.

TACKS, FIXING IN AWKWARD PLACES

Short tacks are very difficult to fix in corners, etc., but if they are forced through a small strip of paper and the paper is held instead of the tack, there will be no more bruised finger nails and lost tacks.

TANK PATCHING

A method of repairing tanks containing liquids by means of a patch bolt is shown in the illustration. A wagon bolt with its head cut as shown is used. A grummet of lamp wick is made and a washer and nut is secured to fit the bolt. The bolt is tilted and inserted in the hole. A file mark on

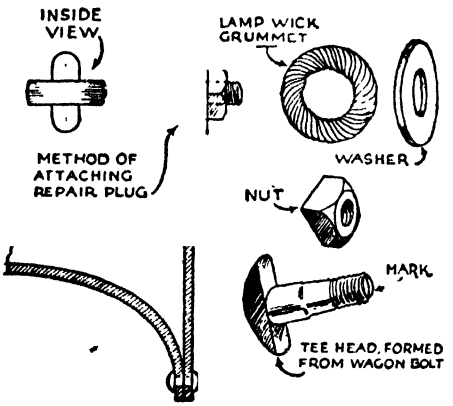


Fig. A.—One Method of Patching a Tank.

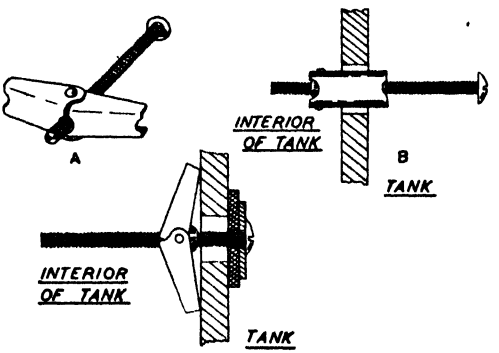
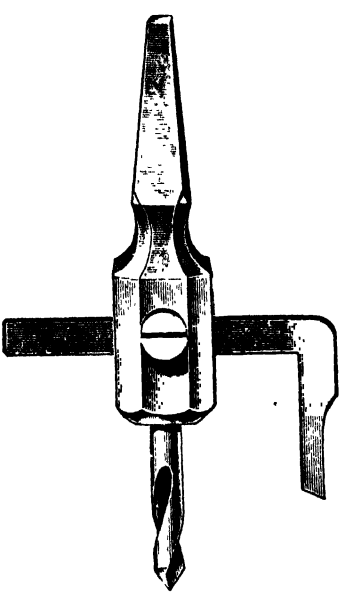


Fig. B.—Using Rawlplug Toggle Bolt to Hold Tank Patch.

the end of the bolt shows the position of the head, which should be across the slot. The illustration shows the correct position of the head. The method of attaching the repair plug is also shown.

The Rawlplug toggle bolt shown in Fig. B (A, B and C) can also be used for holding a grummet and washer. The bolt has a nut member with two hinged "wings," which are closed together against spring pressure for insertion into the hole in the tank. As the screw is $\frac{3}{16}$ in. Whitworth it is necessary to drill out the hole to $\frac{1}{2}$ in. diameter for insertion of the winged nut unit (Fig. B, (B)). Once inside the hole the two wings open outwards under the spring action against the inside wall of the tank. The head of the screw, upon which the grummet and washer have previously been placed, is then screwed up, as shown at (C).

Tanks, Cutting Large Holes in.—Holes up to about 6 inches in diameter may be cut in water tanks and cisterns by means of the cutter illustrated. This consists of a central twist drill of about $\frac{1}{4}$ in. diameter held by a slotted



A Variable-radius Sheet-metal Hole-cutter.

screw, in a central socket. The cutter consists of a square tool-steel bar bent at right angles. The plain square portion can slide in a square hole in the central member so that the cutting radius can be adjusted as desired. The bent-over portion of the cutter is ground so as to cut a clean straight-edged hole in the tank. The cutter bar is secured in the central member by the slotted screw ; that for the twist drill is at the back (not shown). The cutting tool has a tapered square shank, so that it can be used in a carpenter's brace.

TANKS, TO STOP LEAKING

The leaking of water tanks may be remedied by putting in a good quantity of sawdust and filling up with hot water.

After allowing to stand a day or so it will be found that the wood has made good the defect. The operation may be repeated if necessary.

Leakage from the bottom of a domestic hot-water tank or a cold tank, due to corrosion of the metal, can be prevented for several years, if the water system is first drained out, the " manhole " cover of the tank removed by unscrewing the nuts around it and the tank bottom cleared out and dried. Next, enough cement mixture (Portland cement, 1 part, and sand, 3 parts) is prepared, with water to cover about one inch depth of the tank, and is then placed in the tank and well smoothed over the surface, keeping the thickness uniform. Allow about 24 to 36 hours to set, when the tank can be used in the normal manner again.

TAP, CISTERN TYPE

In the home the opportunities for making money by saving it are very numerous, and this applies very forcibly where the worker owns his own

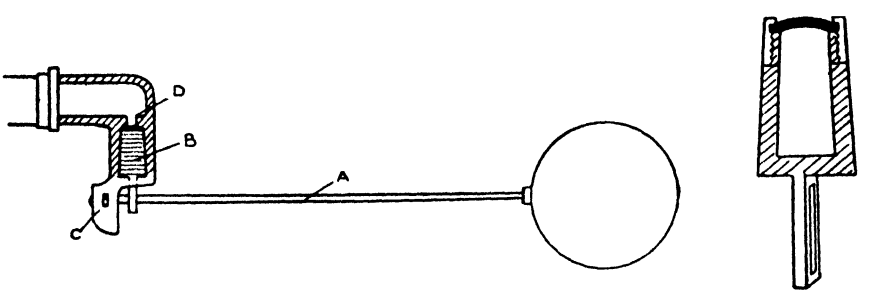


Fig. A. Fig. B.

Details of Ball Cock and its Operation.

house or anticipates doing so. Builders' charges for small repairs frequently seem out of proportion to the amount of work done. The saving effected by doing small repairs is sometimes very large indeed.

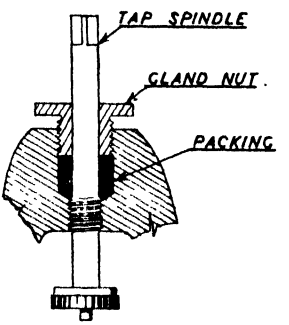
A new washer for a ball valve such as in general use for closet and other cisterns presents no more difficulty than the foregoing. A sketch showing the manner in which it works is shown in Fig. A. An arm to which the ball

is attached passes through a slot in the plunger B, shown separately on a larger scale in Fig. B, and is loosely held by a split pin at C, so that it can freely move up and down. At the top of the plunger is fitted a leather or rubber washer that forms a cushion that effectually closes a small orifice just below the bend of the pipe through which the water passes. The buoyancy of the ball works the valve. Thus when the cistern is empty, the ball arm and plunger being down allows the water to run freely through the orifice. When the cistern is filled, the ball raises the plunger and causes the washer to press tightly in place, thus stopping the supply.

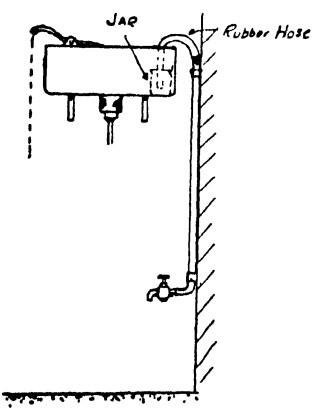
Fitting the New Washer.—The fitting of a new washer is simplicity itself. Pull out the pin C with a pair of pincers, which will free the arm with ball and plunger. If the water is left on it will be best to force a cork into the inlet pipe to stop the supply. The plunger can be then slipped off the arm. This will be found to be in two parts, as shown in Fig. B. Unscrew the top, when the old washer can be taken out, this being forced by the screw up against the rim. A new washer nicely fitting is placed in and the top screwed up and the ball and arm replaced as found.

TAP SPINDLE, LEAKY

After a good deal of use it will often be found that when a water tap is opened water leaks up the stem from inside, and then flows all over the outside surface of the tap. This leakage is due to a faulty packing gland and the remedy is as follows: Remove the tap handle for convenience in access to the gland, although in cases of stubborn handles this instruction is not absolutely necessary. Then, with a pair of pliers or a pipe wrench unscrew the gland nut (see illustration) and take out, with a sharp-ended tool such as a steel knitting needle, the old packing. Prepare a length of new packing from some soft grade of string and smear well with vaseline or any thick grease and then wind around the spindle and push into its cavity in the body of the tap. Use a blunt-ended rod or wire to push the string down. When the cavity is about two-thirds filled, cut off the surplus string and screw the gland nut down. Replace the handle on the tap spindle and test that it works freely. If too free, screw the gland nut down more, but if too tight release the gland nut a little.



Remedying Leaky Tap Spindle.



Taking a Tap-water Supply from Cistern.

TAP SUPPLY TAKEN FROM CISTERN

The following suggestion provides a very simple means of fitting a tap to an ordinary

cistern for the purpose of supplying water without the aid of special kit. All that is required is a length of pipe, tap, pressure jar, and fixing clips. The principle is siphoning; therefore the pipe must be filled before inserting in the jar inside the cistern. The scheme is illustrated by the accompanying drawing.

TAP WASHER, TO FIT

The cause of leaky or constantly dripping water taps is a worn-out or defective washer on the tap valve, in the majority of cases.

These washers are of circular shape, with a central hole. They are made of dressed leather or hard rubber, and fit over a spigot on the brass valve B (Fig. C), a nut being used to hold them against the latter's flat

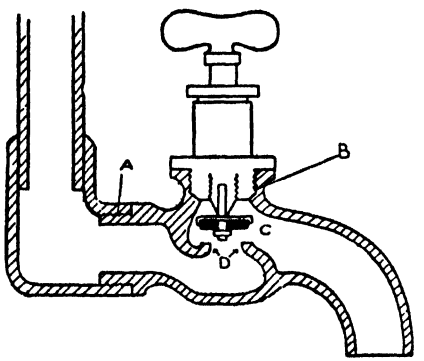


Fig. A.—Section through Domestic Water Tap.

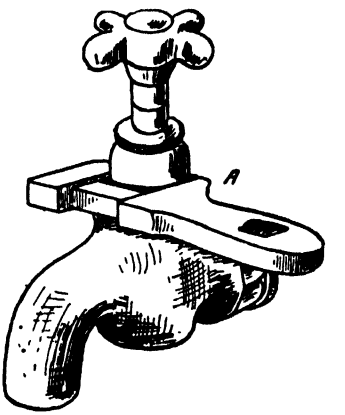


Fig. B.—Unscrewing Upper Part of the Tap.

face. The valve is a loose member, held on to the brass seating of the tap by means of the screw-down handle portion of the tap itself.

To fit a new washer, unscrew the upper part of the tap by placing a spanner on the hexagon portion as shown at A (Fig. B). Some tap threads are made left-handed, so that if it is found difficult to move the screw top in the ordinary way, try the opposite direction of rotation; sometimes the direction of the thread is stamped on the tap.

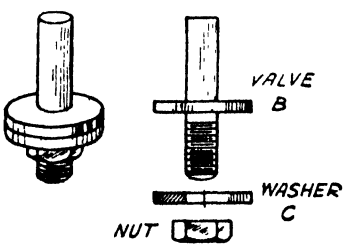


Fig. C.—Typical Water-tap Washer.

It is necessary, of course, to turn off the water supply from the main, before attempting to unscrew the upper part of the tap; test by opening the tap to see that the water has actually been turned off.

Having removed the upper part of the tap body, remove the brass valve B, unscrew the nut securing the washer and take off the old washer.

Tap washers, ready for fitting, can be obtained at most hardware stores,

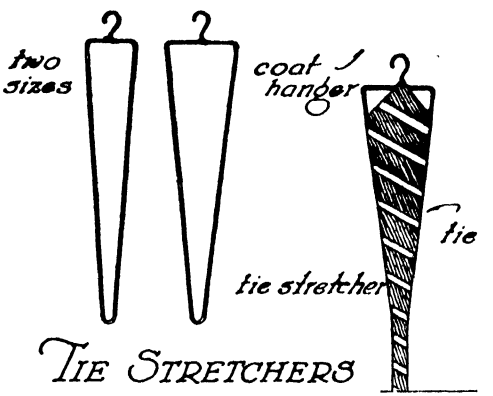
but a new washer can readily be made from a piece of leather belting or even a leather strap. Hard rubber is also very satisfactory for tap washers both for hot and cold taps. It is best to soak the leather in collan oil, olive, or salad oil; do not use a mineral oil as this will perish the leather.

Most washers, when new, are $\frac{1}{16}$ in. to $\frac{1}{4}$ in. thick; they should be a free fit in the hole of the tap, and have a perfectly even and smooth surface.

For hot-water taps, special hard rubber or fibre washers are now sold.

TIE STRETCHERS

Make a set of five or six stretchers for your ties, bending them into shape from wire coat hangers as shown in the drawing. Straighten the wire on either side of the hook for a distance of $3\frac{1}{2}$ in. to $4\frac{1}{2}$ in., depending upon the width of the tie at the front. Straighten out the remaining wire into the stretcher as shown, the lower end being bent to a point so that you can slip it inside the tie. Draw the cloth over the stretcher until it is tight and hang it up by the hook. It will keep your ties smooth, and remove the wrinkles which soon ruin its appearance. Make the stretchers in various widths at the top, so that you can fit any of your ties.



TIE STRETCHERS

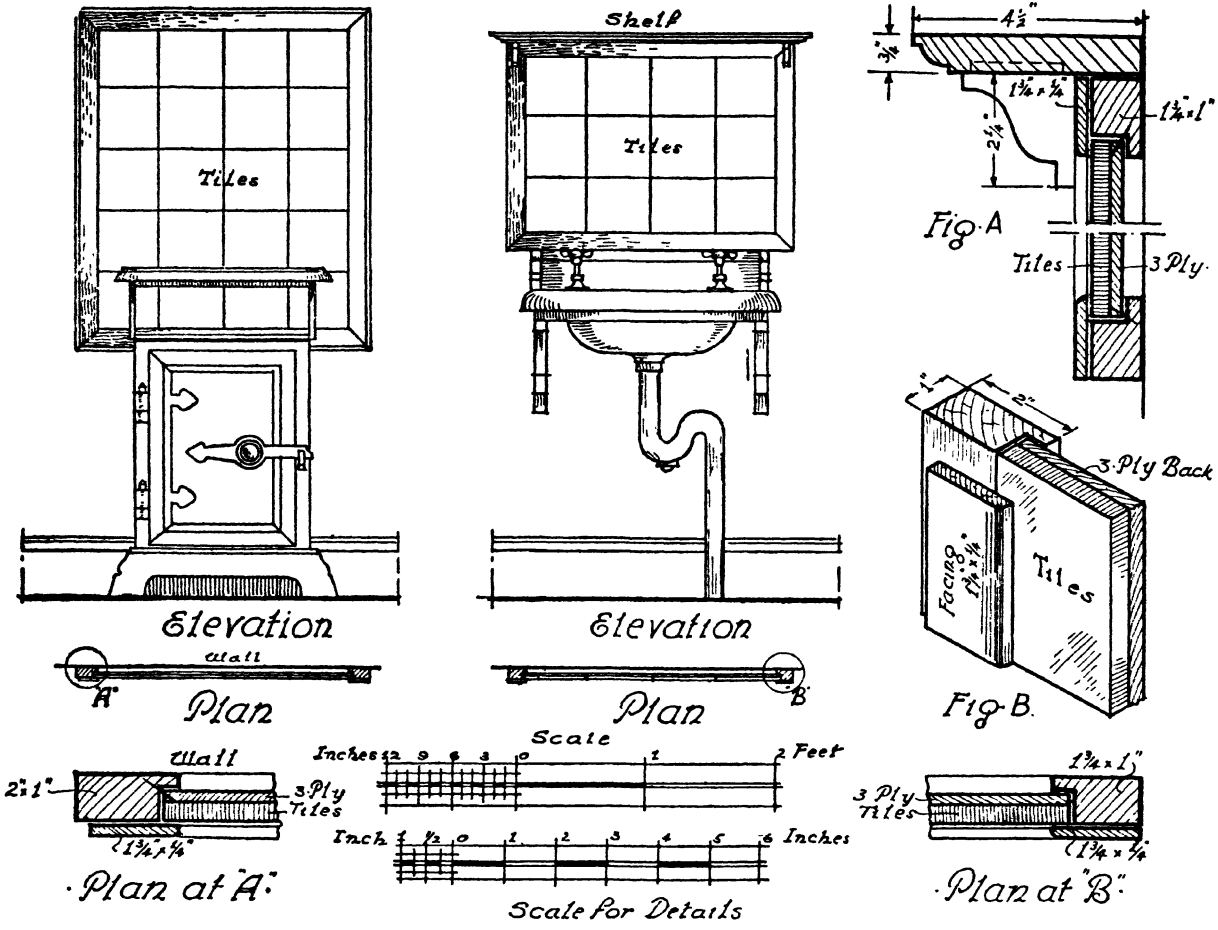
TILE PANELS

Where no special provision is made for keeping the wall behind the gas cooker free from grease and dirt, either by having the wall properly tiled, or by fixing an enamel plate, the wall soon gets smudged and disfigured, and, if let alone, ultimately becomes an eyesore. These remarks are also applicable to that part of the wall behind the wash-hand basin, where, with the continual splashing of water, it is difficult to keep the wall in good condition.

These drawbacks, however, can be overcome by providing and fixing the tile panels described below. These panels are simple and inexpensive to make, practically everlasting, and easily kept clean.

From the drawings it will be seen that each panel consists of a checked frame into which is fixed a three-ply board, bearing on its face enamelled tiles, the joint between the tiles and frame being covered by a thin facing plate.

Panel Backs.—With regard to the method of carrying out the work, the three-ply back should first be cut to dimensions suitable to take so



Typical Applications of Tiled Back Panels.

many whole tiles, as the cutting of tiles is a somewhat tricky job for the amateur. In the illustration of the panel behind the cooker, four tiles are shown in the width, and five in the height, and as these tiles are each 6 in. by 6 in., the width accordingly is 2 ft., and the height 2 ft. 6 in.

The Frames.—The wooden frame, or surround, is next made of a size to take the three-ply back, the rabbet or check running round the four edges being made sufficiently deep to take the combined thickness of the board and tiles, this being about $\frac{5}{16}$ in. The top and bottom rails of the frame can be nailed between the side pieces or tenoned to same as desired.

The backboard is next nailed into the checks of the frame as shown in the enlarged plans at A and B, which show the frames behind the cooker and wash-hand basin respectively.

Fixing the Tiles.—Immediately before starting the tiling, the board receives a coat of paint, preferably white, and while the paint is still wet the tiles are fixed by spreading putty over their backs and pressing them firmly to the board.

After the tiles are set, the $1\frac{3}{4}$ in. by $\frac{1}{4}$ in. facing plates are nailed to the front of the frame, the facing being neatly mitred at the corners.

A Tile Adhesive.—Instead of using putty for fixing the tiles and having to wait for several days before it sets, a better plan is to use a modern tile-fixing cement, such as Rawlplug's tile cement. This is a liquid cement which is applied to the back of tile and the wall surface. The tile is then pressed firmly into place and held there under pressure for a minute or two. This cement is both water- and heat-proof, but being inflammable in its original liquid condition suitable care should be exercised when using it. It is, of course, important to have the wall and tile back quite clean before applying the adhesive.

Panel for Gas Cooker.—It will be observed that the facing plates for the panel behind the cooker are kept in from the outer edge of the frame $\frac{1}{4}$ in., but this is done merely to improve the appearance. Fig. B is a sketch illustrating how the tiles and backboard are fitted into the frame and the position of the facing plate covering the joint.

Wash-hand Basin Panel.—The panel behind the wash-hand basin is made in exactly the same manner, but in this instance the facing on the front covers the whole breadth of the frame. A small shelf, supported on brackets, for holding toilet requisites is provided, the construction being fully shown in Fig. A, which is a section through the panel behind the wash-hand basin.

Fixing the Panels.—The frames may be made of white pine, Oregon pine, or cypress, stained and varnished or painted, whilst the method of fixing the panels to the wall can be by means of mirror plates screwed to plugs let into the wall, or, alternatively, they may be fixed direct to the wall by screwing through the frame to plugs let into the wall.

TILED HEARTH, TO LAY

In the older class of house the hearths are frequently composed of nothing more elaborate than cement, and this makes quite a good job at little expense, although it has not a very attractive appearance. The replacement of the cement with glazed tiles, however, is quite within the ability of any intelligent person, and the addition will effect such an improvement in the room that it is well worth attempting.

The Tiles.—White glazed tiles 6 in. square can be purchased at about 15*s.* per square yard to-day. This size, however, is not altogether suitable for hearths, as much waste is entailed in cutting, and there is a great probability of the tiles being broken afterwards if the fire-irons should happen to fall; the most suitable size for hearth tiles is 3 in. square. The colour can be selected to suit individual taste, but as only about half a yard will be needed, and colours are more expensive than white, the cost will probably amount to 10*s.* or 12*s.* for the number required.

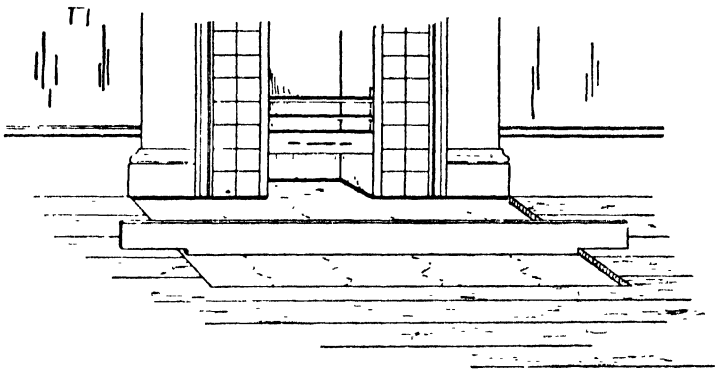
The additional materials that must be provided will be about half a bushel of clean sand and one peck of cement. A trowel, hammer, steel chisel, and straight-edge will be all the tools that are essential.

Preparing the Hearth.—The old cement hearth must first be removed to a depth of 1 in. by cutting it up with the hammer and chisel, care being taken not to jar the ceiling below unnecessarily if the work should happen to be on the first floor. The tiles should be laid out on the hearth to ascertain whether they will fit comfortably in the opening. If a vacant space is left at the side of the hearth which is too small to take a full tile, the floor must be cut away a little at each end, so that an equal number of tiles will just fit into the opening.

The hearth must next be levelled over with mortar, to form a flat bed for the tiles. A straight-edge will be required for this about 4 in. or 5in. wide and 12 in. longer than the opening, with a piece cut out at each end ½ in. deep as shown in the illustration. The mortar is then gauged 3 parts of sand to 1 of cement, and spread over the hearth with the trowel, being straightened as shown by drawing the straight-edge across from back to front with a zigzag motion, so that the projecting portion in the middle of the straight-edge removes all superfluous mortar. This operation must be repeated until the surface is quite straight, and ½ in. below the top of the floor. It must then be left to stand until the following day to harden.

Preparing the Tiles.—Before commencing in the morning, the tiles should be soaked in water for a few minutes until they are saturated, and then stood on edge to drain. The mortar for bedding the tiles must be mixed 2 parts of fine washed sand to 1 part of cement. It is better to make this up a few hours before it is required, and to leave it standing in a heap to set; it can then be knocked up afresh with water for use. The effect of this partial setting will be to "kill" the cement, and prevent it hardening off too rapidly for the tiles to be laid easily.

Laying the Tiles.—Laying should be commenced in either of the front corners, a thin bed of fairly soft mortar being spread, and the tile pressed down until it is exactly level with the floor. The next one is laid in a similar manner, keeping it quite close up to the first, and so on until the front row is completed, the surface of each tile being kept quite straight by testing them with the back of the straight-edge. The next and subsequent rows are then laid until the fireplace is reached. A certain amount of cutting will be required to finish off round the ironwork, the tiles being cut wide enough to push under the stove so that the joint does not show. The cutting can be done with the corner of a sharp iron chisel, tapping it gently with the hammer until a nick is cut all along the line on both sides of the tile. A sharp tap on the back with the edge of the trowel will then cause it to break in two. Some little practice is necessary to carry this out successfully, and a certain amount of waste is bound to



Method of Levelling Hearth for Tiling.

occur; this must be allowed for when ordering the tiles. When the tile needs cutting to a shaped outline, it should be done by chipping small pieces off the edge, gradually working backwards until the line is reached. If the cut is made directly on the line in the first place, the tile will probably break in the wrong place. Some tile layers use a pair of pincers for breaking small pieces off the edge, instead of a chisel.

It is hardly necessary to carry the tiles back to the wall under the fireplace. It will generally be sufficient if the back portion is finished off with cement, although tiles can be employed if desired. The hearth should be allowed a little time to set firm after it is finished, and should then be wiped over gently with a damp cloth, to remove any mortar stains, which, if permitted to dry, would be difficult to clean off.

TILES, DUTCH, FIXING

Old Dutch tiles to be fixed on masonry should be soaked in a bucket of water and every trace of cement that is on washed off. Well damp the masonry and lay on it a bed of Portland cement to which

a small portion of sharp sand has been added, or, instead of this mixture, use plaster-of-paris. Lay the bed for one tile only at a time, or the cement may set too quickly. Fit the pieces carefully together in their beds and afterwards point between the tiles and in the cracks with fine plaster. When this is dry, to disguise the cracks touch with oil colour; a line of black paint $\frac{1}{8}$ in. wide between the tiles will also improve the appearance.

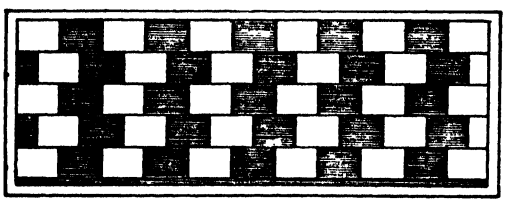
If the tiles are to be fixed on woodwork, provide a piece of slate as a back, and on that proceed as before.

TILES, IMITATION, FOR FIRESIDE HEARTH

Where hearths are usually treated with whiting or other light colouring they can be given a much better appearance by simply drawing a design of tiles or brickwork on the hearthstone, then colouring to suit. The handyman of the house will find the job quite easy to do, while the finished effect will greatly enhance its appearance.

In setting about to renovate the hearth in this way, first clean off the existing white, until the bare stone is reached, when the desired design can be drawn with straight-edge, pencil, or a piece of thin-edged chalk.

Draw horizontal lines across hearth with 3 in. between, then draw vertical lines along the first row, 4 in. apart. This gives the first row of tiles. In order to give the desired effect, the second row of vertical lines must be so measured that the 4 in. comes exactly half-way under the tile above.



Imitation Tiles for Hearth.

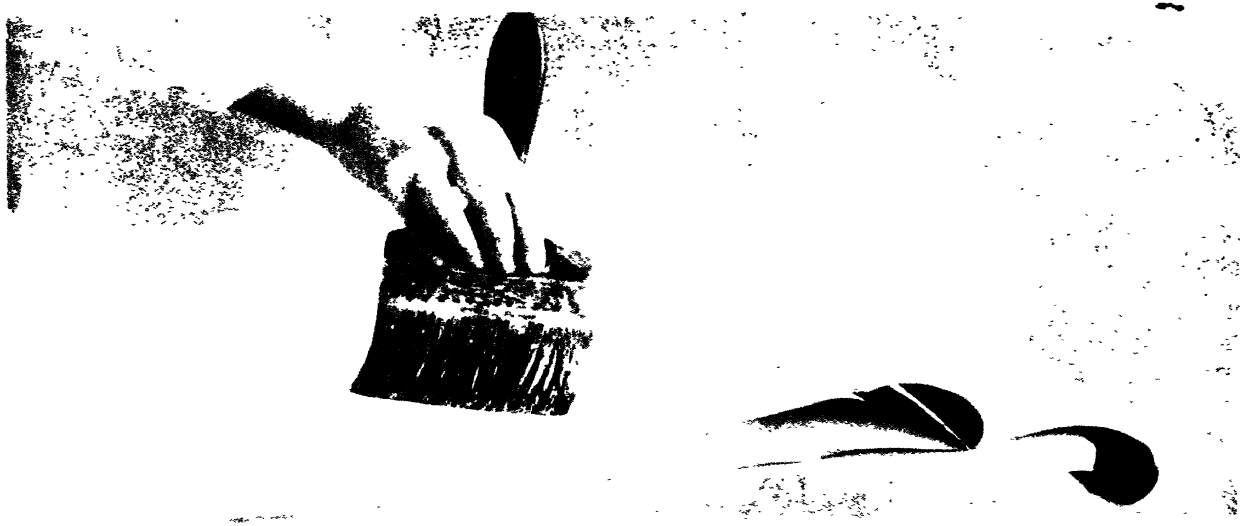
By keeping this measurement right down to the bottom of the hearth, the tiles will be all drawn out, and ready for painting on.

Two different colours will be found sufficient, using each colour on alternate tiles, and changing the colour at the beginning of each row, i.e. if the first row was started with one colour, the second row would be started with the other colour being used, and so on to the last row. Black and white could be used, or brown and white, but, so that this can be washed, the paint should contain white lead. The joints of each tile can be drawn over, when finished, with the darker colour, so as to give the tiles a better appearance of being set in instead of painted on.

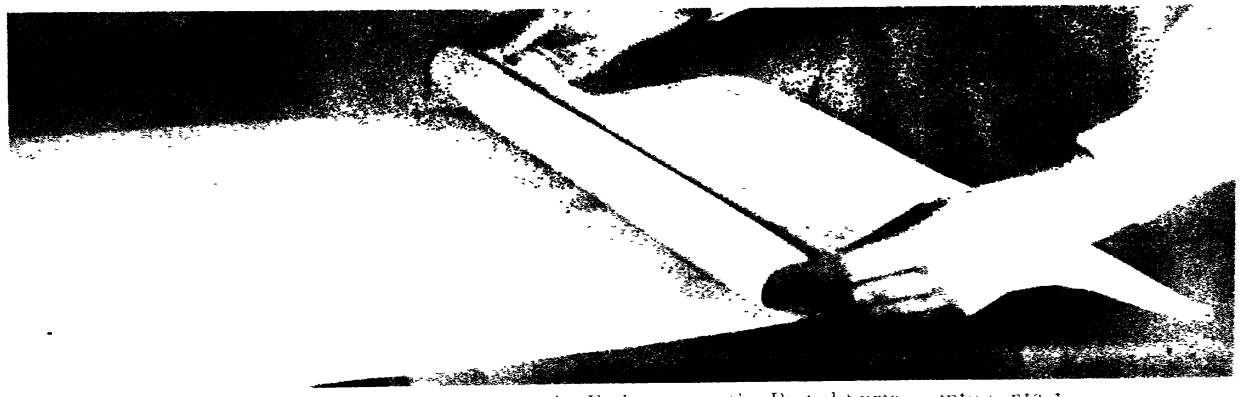
WALL-PAPER, CLEANING OF

There are several methods of cleaning wall-paper, stale bread or half-baked dough being most often used. The following, however, gives better results, and may be used not only on wall-paper, but on walls finished with washable water paint. The materials required are 7 lb. of flour, 2 oz. of yeast, and 4 oz. of potatoes.

The potatoes are peeled, boiled, and mashed fine; then mixed into dough. After an interval this mixture should be baked, and while still



(1) Prepare the Paste. Apply it generously but evenly with a Large Distemper Brush. The Correct Method of manipulating the Brush is here illustrated.



(2) The Paper is folded over from the End, turning the Pasted Surfaces into contact.

WALL-PAPERING OPERATIONS, I



(3) Trim the Edges of the Paper at the Frieze Rail and at the Skirting. Then brush the Edges firmly into contact



(4) Apply the Paper to the Walls as shown, taking care to keep the Edge vertical. See that the Patterns on the Two Parts match.



(5) Brush over the Paper with Clean Broom-head or Large Flat Brush. Use Long Sweeping Strokes to get rid of Blisters and Other Inequalities

WALL-PAPERING OPERATIONS.

warm the crust should be removed, the inside is then kneaded into ball-like shapes and kept in a cool place. These balls are drawn, in one direction only, over the surface of the wall-paper and easily remove the accumulated dirt. As the ball becomes dirty, a portion of the surface is removed with a sharp knife.

Here is another recipe which is much more satisfactory than bread. Take a breakfast-cup full of flour and make it into a moist ball, then work in plaster-of-paris rolled fine until it is of the consistency of putty. It should not stick to the hands. Clean downwards, turning in the dirty surface. Burn the ball when finished with—don't give it to the dog or to the birds!

WALL-PAPER REMOVED EASILY

If you have any difficulty in scraping off old wall-paper, the following method is a 100 per cent. help. Remove all the furniture out of the room, and cover the floor with old newspapers. Then get an ordinary sprayer and fill with warm water. Spray all the walls, and after they are done, wait about ten minutes to give the water a chance to soak in, then without the slightest difficulty the wall-paper may be scraped off.

WARPED DOOR AND WALL PANELS

Wood panels may warp owing to the two sides of the panel absorbing different amounts of moisture from the atmosphere. This causes the two sides to expand unequally, which puts the whole panel under an internal stress which finally causes warping.

This is often caused during varnishing. If one side of the panel is left unvarnished or unpainted, this side will absorb more moisture from the atmosphere, if same is damp, which may cause warping. It is therefore advisable to paint or varnish both sides of the panel with the same kind of paint or varnish and with an equal number of coats.

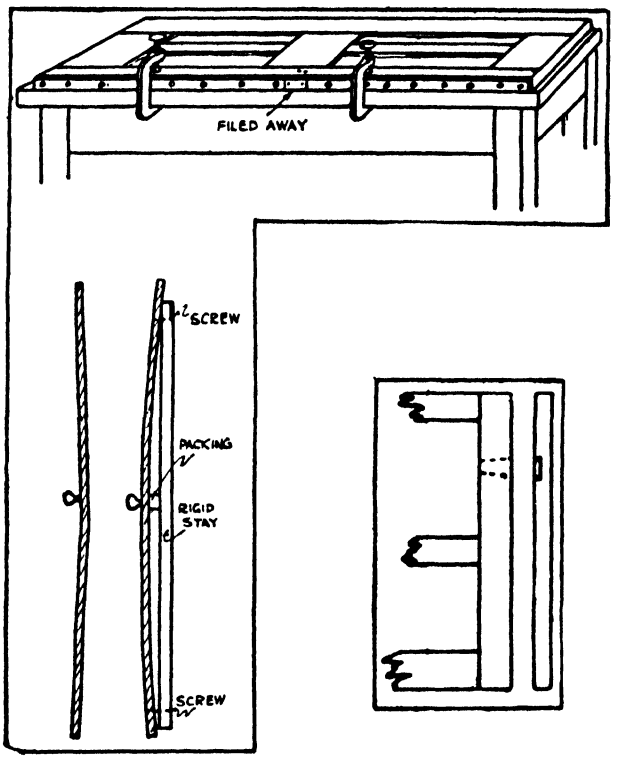
WARPED DOORS

The following are remedies for the warping of doors.

Remove the door from its hinges and obtain an iron strip ½ in. thick the same length as the door, its width to be exactly the same as the thickness of the door. Countersunk holes to take 2 in. screws should be drilled about every 6 to 9 in. along it. If the door previously had a tenon lock this must be removed and a surface lock substituted; where this fits, a portion of the iron strip will have to be filed away to accommodate the lock's flange; two screw holes will be necessary; these can be tapped if desired.

Now prepare the door. From it saw off a ½-in. strip, along the free edge of the door. This strip of wood sawn off should, of course, be the same size as the iron which will replace it. Clamp the door to a table or bench as shown in the sketch, and whilst quite flat screw on the iron strip.

This will hold the door in that position. When finished the iron strip can be painted to match the door. The lock can now be replaced and the door rehung.



Illustrating Method of Straightening Warped Doors.

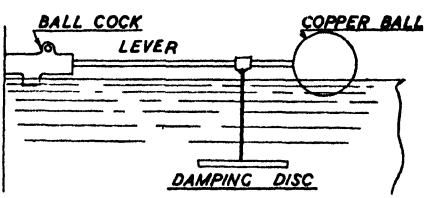
A light cupboard door may be straightened by bending it in the reverse direction of the warp as shown in lower part of the illustration.

The wedge system of correcting warp in a panelled door is shown by the small illustration. A dovetailed wedge is driven into the stile as indicated, several wedges being used if necessary.

The wedge should be about one-third of the thickness of the stile, and the angle of the dovetail should be little less than a right angle; if too acute there is danger of splitting the stile. Bear down on each end of the stile when driving the wedge home and avoid the mortises. If a matchboard door, knock to pieces and reverse alternate boards.

WATER HAMMER IN PIPES

If air becomes trapped in a pipe bend or at a dead end in the water supply system the air tends to set up a state of vibration by compression and expansion, to which the water in the system may respond by resonance and thus set the whole of the system vibrating. If the ball-cock lever in the upper (roof) tank be examined when "water hammer" occurs, it will be found to be in a state of violent vibration in tune with the knocking sounds.



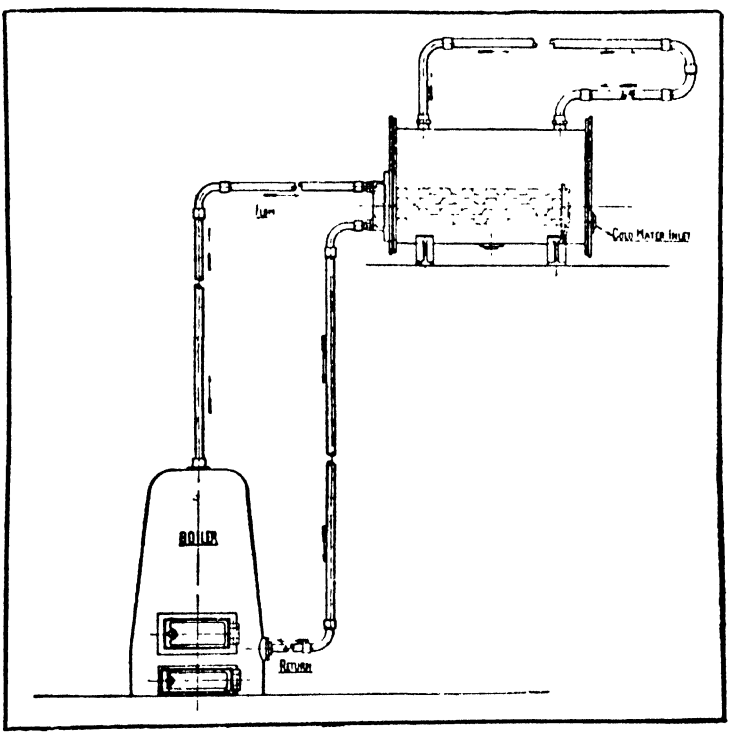
Method of Preventing Water Hammer in Pipes.

It is often possible to cure "water hammer" of this kind by fitting a damping disk to the arm carrying the hollow copper ball, somewhat as shown in the illustration. For ordinary domestic systems a square plate of about 5 to 6 in. sides made of thin

sheet metal that will not corrode under the water will be found an efficient vibration damper that will cure the "water hammer" in domestic cold-water supply systems. Instead of sheet metal, sheet glass with a hole drilled through the centre can be used. Bakelite sheet or any other material that is heavier than water will do. The sheet and its attachment should, however, be kept as light as possible as their weight opposes that of the ball and thus tends to reduce the closing pressure of the ball-cock valve.

WATER HEATING BY CALORIFIER

The bad effects of hard water in all sorts of installations are well known, and it has been part of our heating engineers' work to devise systems



The Calorifier Method of Heating Water.

for reducing them to a minimum. One method is to install a water-softening device, but in the many cases where this is not practicable the best thing would seem to be to localise any likely troubles, or at least to ensure that the more vulnerable parts shall be kept free from them.

In central heating installations there is no doubt that the part which it is essential shall be kept free from trouble is the boiler, cessation of working of which for repair or overhaul entails a complete stoppage of the system.

Where hot water so produced is intended for domestic purposes, it

is imperative that it should not suffer from any rustiness that it might acquire from the boiler.

Both these conditions can be satisfied through the installation of a calorifier—a device in which steam or hot water is used to raise hot water and of which we here show an example.

The Boiler.—The boiler is of an ordinary type with flow and return connections to a drum or barrel which forms the body of the calorifier. In this barrel is a nest or battery of patent tubes through which flows the hot water from the boiler before its return to its source. Towards the bottom, at the right-hand end of the barrel, is a cold-water inlet through which water enters to be heated by the calorifier tubes and to rise and circulate throughout the system.

In such a system it is clear that the hot water generated in the boiler is used merely as the heating unit and moves only in a limited circuit. If this relatively small amount of water is soft, no scaling can occur in the boiler, which itself can no longer be blamed for rusty water.

Boiler Temperature.—The temperature in the boiler must of course be high—of the order of 180° to 200° F. The temperature to which the cold supply is raised depends naturally on the amount used, but provision is generally made for a final temperature of about 150° F.

An interesting and useful extension in the use of the calorifier for this purpose occurs in many manufacturing concerns, such as breweries, where there is often a large quantity of hot water or other liquid constantly running to waste. This could quite easily be made to take the place of the boiler, supplying the calorifier direct with an appreciable economy of heating in the production of a given amount of hot water.

WATER-PIPE REPAIRS

With the approach of cold weather many householders become apprehensive about their water pipes. Whilst sudden bursts due to frost cannot be altogether prevented, the necessity of fetching a plumber when a burst occurs can be avoided if the following instructions are carefully followed.

When a burst due to frost occurs the pipe develops a split or slight crack. This crack is practically in every case so very fine that water rushes out in a spray, and when the water is turned off at the stop tap the crack can hardly be seen. The water having been turned off will leave the house pipes full. These must be emptied by running the house taps, after which the position of the crack must be definitely ascertained and noted, as the process of scraping the joint will cover the crack. The pipe cleats near the crack must now be loosened, and the pipe drawn away from the wall to enable the soldering to be easily accomplished. Now scrape round the crack for about half an inch every way, and apply the flame of a small blow-lamp near the crack to heat up the pipe at this point; meanwhile, in a ladle—a tin can with seamed joints will do—melt sufficient solder to cover the space cleaned on the lead pipe to about $\frac{1}{4}$ in. thick. Keep the solder in the just-molten stage until required. The joint

having been made rather hot with the blow-lamp or a bunch of tapers, is now ready for the next process.

Horizontal Pipe.—We will suppose it is an horizontal pipe. Soften a lump of plasticine and roll it into a long length. This is now stuck on the pipe round the cleaned space, as shown in Fig. A, the plasticine being taken round the pipe as shown, and the sides round the cleaned space raised to form a well or dish on the pipe. This should be done very quickly, before the pipe loses much heat. When the well is formed, the cleaned space should be brushed with Fluxite, or any other good soldering flux, and the molten solder in the ladle poured in the well. After a few moments, the plasticine can be removed. The joint will now be as shown in Fig. B, and the pipe will be stronger at this point than before. For neatness the edges of the patch can be filed off.

Vertical Pipe.—Should the crack occur in a vertical pipe and it is impossible to bend it near horizontal, the following method should be adopted. It entails slightly more labour, but the results are quite as substantial as when soldering an horizontal pipe. Having cleaned about the pipe as before, cut and bend a piece of thin sheet aluminium to the shape shown in Fig. C and snip and file out the part to the curve of the pipe. The part of the pipe about the crack having been heated as previously described, the aluminium mould must be placed over the split and covered and secured with plasticine, as shown in Fig. D. Brush the pipe inside the case with flux and pour solder in until full. In a moment or so the plasticine and mould can be taken off, leaving the crack covered with solder. To complete the joint, file off the edges with a rough-cut file. With a little consideration it will be seen that this simple method of sweating—as it should be more correctly termed—can be applied in any position and in a variety of ways.

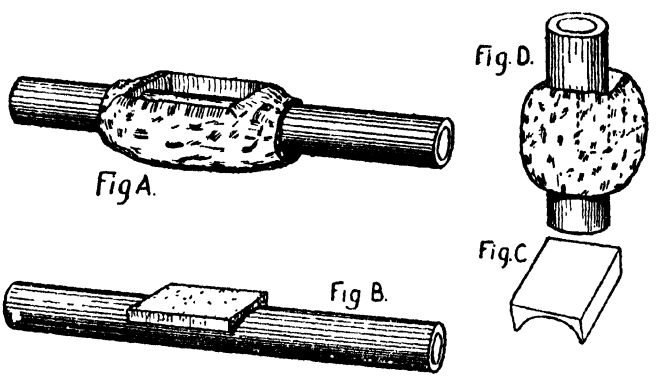


Fig. A.—Forming Mould on Lead Pipe.
Fig. B.—Crack covered with Solder.
Fig. C.—Aluminium Mould for Pipe.
Fig. D.—Aluminium Mould secured on Vertical Pipe.

Soldering Lead Water Pipes.

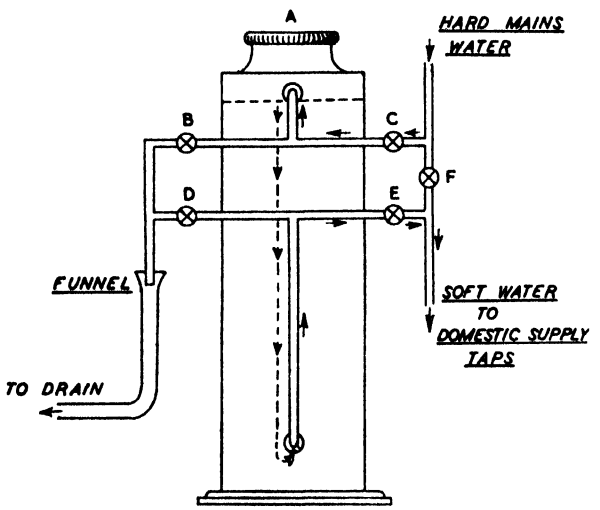
WATER SOFTENERS, CARE AND MAINTENANCE

Water softeners act on the principle of removing the permanent hardness of water, which is due to the presence in the water of the sulphates of lime and magnesium. These salts cause the domestic water pipes and

boiler to become encrusted with hard deposits and also kettles to fur up. They necessitate the use of much more soap than softer water, e.g. rainwater, would require. Other possible detrimental effects are the formation of scum on the sides of baths and wash-basins; deposits on metal vessels; physical effects, e.g. indigestion and rheumatism, and difficulty in personal and clothes washing.

The ordinary water softener contains a relatively large quantity of earthy-appearance material, through which the hard water from the mains supply flows. This material removes the permanent hardness salts so that the softened water flows out from the other end of the softener. After a period of time, the softener material ceases to remove the hard salts, so that it becomes necessary to treat it, chemically, in order to bring it back to its original state. This is very easily done by the process of passing a quantity of saturated domestic salt solution through the material, when it is again ready for a further period of service, depending upon its capacity and the amount of water taken through it. With the proper size of softener to suit the hardness number of the water and the quantity normally used, the softener will require regeneration about once per week. For this, the capacity should be about 700 gallons for minimum hardness of 16°. The illustration shows the usual tap and pipe arrangements of a domestic softener. The mains, or hard, water when the softener is in use flows in the direction shown by the arrows, the cocks C and E being fully opened.

To Regenerate the Softener.—All the open cocks should first be closed. The screwed cover A is then taken off and the recommended quantity of salt introduced into the opening. The cover is then replaced tightly. Next, open the mains cock C and the cock D slightly. The salty water will then flow slowly into the drain pipe G. After about 15 to 20 minutes the water should be free from any salt; if any doubt exists dip the finger into the outlet from D and taste. Finally, *backflushing*, to get rid of surplus deposits, is effected by opening the cocks F, E and B, keeping C and D closed. After this the material in the softener will be in new condition again and the softener is then put into its normal softening operation by opening the cocks C and E, closing the rest. In some cases salt solution is used instead of salt, but the general procedure of regeneration is the same.



Showing Typical Layout of Domestic Water Softener.

WATER SUPPLY, TO SOFTEN

The following notes are intended to assist those who are troubled by an excessively hard water supply from a well.

Water with a hardness not exceeding four degrees is very soft; if over four but not exceeding nine, moderately soft; if over nine it may be called hard. Hardness is divided into two classes: permanent, due to sulphate of lime and magnesium; and temporary, due to carbonate of lime. Permanent hardness is a combination of sulphuric acid and lime, and is very much less than that due to carbonate of lime. The supply being taken from a deep well, which is no doubt sunk in one of the lime formations, such as chalk, limestone, or oolite, in this case the greatest percentage of hardness would be temporary; one degree of temporary hardness corresponds to one grain of carbonate of lime per gallon. The least expensive method of softening the water would be by the Clarke process, precipitating the carbonate of lime in a settling tank by adding quicklime, the amount of lime necessary being 1 oz. for every degree of temporary hardness per 1,000 gallons. Before adding the lime to the water it will be necessary to know the degrees of temporary and permanent hardness, which any chemist would ascertain by the soap test. The gravitation pipe from the tank being lead, and as soft water has a solvent action on lead, it would be advisable not to precipitate all the carbonate of lime if the water is used for cooking or drinking. To carry out the process, a tank is constructed near the pump, for the pump to discharge direct into the tank. The gravitation pipe from the settling tank to the storage tank is connected to the settling tank about 6 in. from the bottom, and to allow the precipitate to be washed out an outlet pipe is fitted to the bottom of the settling tank, the settling tank being constructed in brickwork or concrete rendered in cement mortar. A convenient capacity for the settling tank would be 500 gallons, this will be sufficient to fill the storage tank and allow sufficient to flush out the precipitate after softening. To soften the water, weigh out the quicklime at the rate of ½ oz. per degree of temporary hardness per 500 gallons. Slack this in a pailful of water, stir up the milk of lime and pour it immediately into the tank containing at least 50 gallons of the water to be softened, taking care to leave in the pail any heavy sediment that may have settled to the bottom in the few seconds that intervened between the stirring and pouring. Fill the pail again with water, and stir and pour as before. The remainder of the 500 gallons of water must now be pumped in. If the rush of water thus added does not thoroughly mix the contents of the tank, this must be accomplished by stirring with a wooden paddle. The water will now appear very milky, owing to the precipitation of the chalk which it previously contained in solution, together with an equal quantity of chalk which is formed from the quicklime added. The water will be sufficiently clear for washing in three hours but to render it clear enough for drinking or cooking purposes at least twelve hours' settlement is required.

WHITE ENAMEL PAINT, TO CLEAN

Take a bowl containing warm, slightly soapy water and a basin with a little powdered whiting. Wring out a soft flannel in the soapy water and dip it into the whiting. Then wash the paint gently till clean, and finish off with a chamois leather wrung out in cold water. This method keeps the paint quite fresh and glossy.

WHITE HEAT STAINS ON POLISHED MAHOGANY

It is well to understand the nature of the trouble and the recipe. Mahogany is usually french-polished. The liquid known as " french polish " is shellac dissolved in methylated spirit, and is scientifically rubbed on, the spirit evaporating, leaving a very thin hard surface of the shellac filling up the grain pores of the wood.

Staining Solution.—Anything very hot put upon such a surface is likely to leave a bleached impression. Therefore, what is needed is a staining solution that will strike into the bleached surface. This is usually made by dissolving aniline dye powder (" Bismarck " red and " walnut " brown) in methylated spirit in separate bottles, then add about one-third the quantity of french polish to each. In a separate vessel carefully mix a little of the two liquids by degrees, using judgment and testing to attain the correct mahogany shade. Apply to the bleached surface with a soft camel-hair brush. If the place is rough it should be rubbed lightly over with the finest of glass-paper, or pumice powder. It is better to have the stain a little too light than dark, because an extra stroke with the brush can give a deeper tone. The work has to be done with care in a warm atmosphere and should render the mark unnoticeable; but in the case of a highly polished surface, in a certain light there could be seen a duller mark where the fault had been, unless the whole surface were gone over with a final process of polishing.

There is a proprietary composition, known as Composil, which is supplied in leaden tubes as a paste. When vigorously rubbed over heat marks on mahogany, oak or walnut, these stains disappear and the surface becomes polished again.

Only Perfect Remedy.—The only *perfect* remedy is to scrape the surface and repolish from the bare wood. For walnut wood the brown stain alone might do, and there is also a black, which is useful in getting the various shades of dark woods. These powders are very strong. In usual times one pennyworth is enough to make at least one quart of stain. They can be bought at paint stores, also the polish and spirit.

WINDOWS, TO MAKE WATERTIGHT

To prevent rain driving in under a sash window, use the following remedy, which is cheap and simple but most effective. Nail to the under side of the bottom sash a strip of rubber piping, such as is usually employed as a draught excluder on doors.